



Class

Book



DIRECTORY
TO THE
IRON AND STEEL WORKS
OF
THE UNITED STATES,

EMBRACING A FULL LIST OF THE BLAST FURNACES, ROLL-
ING MILLS, STEEL WORKS, BLOOMARIES, AND TIN AND
TERNE PLATE WORKS IN THE UNITED STATES;
ALSO CLASSIFIED LISTS OF WIRE ROD MILLS,
RAIL MILLS, STRUCTURAL MILLS, PLATE,
SHEET, AND SKELP MILLS, AND BES-
SEMER, OPEN HEARTH, CRUCIBLE,
AND STEEL CASTING WORKS.

COMPILED AND PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

SEVENTEENTH EDITION. CORRECTED TO MARCH 1, 1908.

PHILADELPHIA:
THE AMERICAN IRON AND STEEL ASSOCIATION,
No. 261 SOUTH FOURTH STREET.
1908.

Y669.102

AS1

1908

2p. 2

Entered, according to Act of Congress, in the year 1908,
BY THE AMERICAN IRON AND STEEL ASSOCIATION,
In the office of the Librarian of Congress, at Washington.

r TS301.A6
1908
Directory to the iron and
steel works of the United
States
Philadelphia, Pa. : The
Association,

PRINTED BY
J. B. LIPPINCOTT COMPANY,
EAST WASHINGTON SQUARE,
PHILADELPHIA.

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PREFACE TO THE SEVENTEENTH EDITION.

THE American Iron and Steel Association presents herewith to the American iron trade another and thoroughly revised description of the blast furnaces, rolling mills, steel works, forges and bloomaries, and tinplate and terne plate works in the United States. The information contained in this edition of the Directory has been brought down to the latest possible date prior to its publication. The general plan of compilation adopted in the preparation of recent editions of the Directory has been followed in the present edition. Whenever possible the history of each plant has been preserved, giving the date of its erection, with all subsequent additions to the plant, changes in ownership, if any, etc. In many instances the equipment of the plants has also been more fully described than in previous editions, and more attention has been given to the organization of companies, including capitalization and lists of officers. An exact system of cross references, adopted in previous editions, shows the relation of each plant to other plants under the same ownership. The alphabetical arrangement of previous editions is retained. A comprehensive table of contents and a complete index will be appreciated by all who will have occasion to consult this edition of the Directory. Every line of information contained in these pages has been obtained directly from the manufacturers and is given publicly by their authority. In the preparation of this edition of the Directory the services of four experienced clerks have been constantly engaged for eighteen months.

This edition of the Directory embraces exactly 516 pages, including the index, and forms a larger volume than any of its predecessors.

Part I of the present edition, occupying 230 pages, embraces descriptions of the United States Steel Corporation and of the operating companies and all the properties that are under its control; also of all the independent companies whose capitalization, lists of officers, etc., as well as the descriptions of their plants, often very elaborate, are naturally looked for in a prominent part of a volume of the scope of the Directory. Some companies which were included in Part II of the 1904 Directory are now transferred to Part I. The descriptions in this division of the Directory embrace coal and iron ore mines, coking plants, limestone quarries, railroads, lake vessels, etc., as well as the blast furnaces, rolling mills, steel works, bloomaries, and tinplate and terne plate works. Many changes in the ownership as well as in the equipment of plants de-

scribed in Part I and Part II of the Directory for 1904 will be noticed in the present edition.

Part II, occupying 190 pages, embodies a description of all iron and steel works in the United States that are not described in Part I, and it also gives the name and address of every company which manufactures iron or steel that is described in Part I, thus presenting a continuous and complete list of all the iron and steel works in the country. In Part II the arrangement is by States and districts, blast furnaces coming first, followed by bloomeries and rolling mills and steel works. Part II also contains a list of long inactive, abandoned, or dismantled iron and steel works.

Part III, occupying 56 pages, classifies for ready reference the leading products of the rolling mills and steel works, the arrangement being by States. It includes all Bessemer steel works, open-hearth steel works, crucible steel works, steel casting works, rail mills, structural mills, wire-rod mills, skelp mills, plate and sheet mills, black plate mills, and tinplate and terne plate works.

Part IV, occupying 24 pages, contains information concerning changes in officers, ownership of plants, etc., that occurred while the main part of the Directory was passing through the press; also the index to the Directory; also pig iron brands.

Whole Number of Blast Furnaces.—In the edition of the Directory for 1904 we described 428 completed furnaces as being then active or as having been reported to us as likely to be some day active. We gave the annual capacity of these furnaces as amounting in round numbers to 28,114,000 gross tons, not all of which capacity could, of course, be employed at the same time; nor would some of the furnaces enumerated ever run again. In the present edition we describe 448 completed furnaces, either active or reported to us as likely to be some day active, with an annual capacity of 34,833,900 tons. Eliminating some of the furnaces in the latter category as being in our opinion dead for all time there remain about 420 live furnaces to-day. The annual capacity of these furnaces we place in round numbers at 34,000,000 gross tons. Our actual production of pig iron in 1907 was 25,781,361 gross tons. Since 1904 we have transferred 24 furnaces to the abandoned or dismantled list.

Furnaces Building.—In June, 1904, we enumerated 17 furnaces in course of erection or being rebuilt, namely, 3 in New York, 5 in Pennsylvania, 1 in Virginia, 2 in Alabama, 4 in Ohio, 1 in Michigan, and 1 in Colorado. In the present edition we enumerate 28 furnaces in course of erection, namely, 2 in New York, 8 in Pennsylvania, 1 in Alabama, 9 in Ohio, 4 in Indiana, 2 in Illinois, 1 in Michigan, and 1 in Wisconsin. In the figures for both years we do not include projected furnaces or furnaces that had been undertaken

and work upon which had been suspended. Several furnaces which were in course of construction when Part I of the Directory was printed have since been completed, while work on others has been temporarily suspended. In addition work has since been started on 4 furnaces which were classified as projected in November, 1907.

Fuel Used in Blast Furnaces.—Of the 428 furnaces described in the edition for 1904 56 used charcoal and 372 used anthracite and bituminous fuel. Of the 448 furnaces that are now described 49 use charcoal alone, 1 uses charcoal and coke mixed, and 398 use anthracite and bituminous fuel. Seven plants, not included above, can make ferro-silicon, ferro-chrome, etc., by electricity.

Capacity of Furnaces According to Fuel Used.—The average annual capacity of the 56 charcoal furnaces enumerated in 1904 was 15,207 gross tons, and the average annual capacity of the 50 charcoal and mixed charcoal and coke furnaces enumerated in November, 1907, was 15,200 tons. The average annual capacity of the 372 mineral fuel furnaces in June, 1904, was 73,286 tons; in November, 1907, the average annual capacity of the 398 mineral fuel furnaces was 85,613 tons.

Rolling Mills and Steel Works.—In the edition of the Directory for 1904 there were enumerated 572 completed rolling mills and steel works, 12 in course of erection, 1 being rebuilt, and 2 partly erected. In the present edition we enumerate 598 completed rolling mills and steel works, 15 in course of erection, and 2 partly erected. In addition the Directory mentions 15 plants which were projected in November, 1907. The annual capacity of the completed rolling mills in November, 1907, was 31,599,930 tons of finished rolled products, against 25,978,050 tons in June, 1904.

Puddling Furnaces.—The number of puddling furnaces in June, 1904, each double furnace counting as 2 single furnaces, was 3,161. In November, 1907, there were 2,635 puddling furnaces, a decrease of 526 furnaces. The highest number of puddling furnaces reported in the Directory was in 1884, when 5,265 were enumerated.

Bessemer Steel Works.—In June, 1904, we described 32 standard Bessemer steel plants with 75 converters, 1 Clapp-Griffiths plant with 1 converter, 2 Robert-Bessemer plants with 3 converters, 10 Tropenas plants with 14 converters, 1 Bookwalter plant with 1 converter, 1 Evans-Wills plant with 2 converters, and 4 plants with 7 converters which made steel by special processes: total number of Bessemer plants, 51; total number of converters, 103. In November, 1907, there were enumerated 70 completed, 2 building, 1 partly erected, and 4 projected Bessemer steel works. Of the completed works 30 were standard Bessemer plants with 71 converters, 1 was a Clapp-Griffiths plant with 1 converter, 2 were Robert-Bessemer

plants with 3 converters, 20 were Tropenas plants with 29 converters, 1 was a Bookwalter plant with 4 converters, 1 was a Wills plant with 1 converter, and 15 plants with 22 converters made steel by other minor Bessemer processes: total number of completed converters, 131. In addition 1 side-blown Adams plant with 1 converter was partly erected, 1 modified Bessemer plant and 1 Tropenas plant with 1 converter each were being built, and 2 Tropenas plants with 4 converters and 2 special Bessemer plants with 3 converters were projected. To existing plants 2 standard Bessemer converters and 1 Wills and 1 special converter were being added and 1 existing Tropenas plant contemplated adding another converter. Since June, 1904, 3 standard Bessemer plants and 8 converters and 1 Tropenas plant with 2 converters have been dismantled. The annual capacity of the completed and building Bessemer converters in June, 1904, was 13,628,600 gross tons; in November, 1907, it was 15,020,200 tons, an increase of 1,391,600 tons.

Open Hearth Steel Works.—The Directory for 1904 described 135 completed open-hearth steel plants with 549 completed furnaces. In the present Directory we describe 159 completed plants with 691 completed furnaces. In June, 1904, 5 open-hearth plants with 9 furnaces were building, 2 plants with 3 furnaces were partly erected, 17 plants were projected, and 13 furnaces were being added to existing plants. In addition an existing plant had 3 partly-erected furnaces. In November, 1907, 13 open-hearth plants with 66 furnaces were building, 2 plants with 2 furnaces were partly erected, 7 plants with 24 furnaces were projected, and 31 furnaces were being added to existing plants. In addition 1 existing plant had a partly-erected furnace. The annual capacity in ingots and direct castings of the 691 completed and the 100 building and partly-erected open-hearth furnaces in November, 1907, was 18,824,900 gross tons, against an annual capacity in June, 1904, of 11,335,100 tons, showing an increase of 7,489,800 tons in a little over three years.

Growth of Basic Steel.—In the Directory we indicate the character of the steel made at our open-hearth works, whether acid or basic, or both. Of the 549 completed furnaces in June, 1904, 364 were prepared to make basic steel and 185 to make acid steel, and of the 28 building and partly-erected furnaces 24 would make basic steel and 4 would make acid steel. The completed and building basic furnaces had an annual capacity of 9,319,200 tons and the acid furnaces of 2,015,900 tons. In the present Directory 199 open-hearth furnaces are described as being prepared to make acid steel and 492 furnaces to make basic steel; also 4 acid furnaces and 96 basic furnaces as being built or as partly erected: total, 203 acid and 588 basic furnaces. The acid furnaces have an annual capacity

of 2,273,400 gross tons of ingots and castings and the basic furnaces of 16,551,500 tons.

Crucible Steel Works.—In June, 1904, there were 57 completed crucible steel plants, equipped with 3,606 pots, and their aggregate annual capacity was 226,610 tons. In November, 1907, there were 79 completed plants, equipped with 4,501 pots, and their aggregate annual capacity was 292,585 tons. In addition 2 plants, with 72 pots and an annual capacity of 2,800 tons of ingots and castings, were being built and 2 plants were projected.

Steel Castings.—The production of steel castings has greatly increased in the last few years. In June, 1904, there were 84 open-hearth steel plants which were prepared to make steel castings and in November, 1907, there were 101 plants of this character. The number of plants which could make steel castings by the standard Bessemer process or by its various modified processes increased from 20 in June, 1904, to 43 in November, 1907. By the crucible process the increase in the same period was from 26 plants to 45 plants and by special processes from 4 plants to 10 plants.

Rail Mills.—In the edition of the Directory for 1904 we enumerated 44 completed rolling mills which were prepared to make standard, girder, light T, and other iron and steel rails. In addition we described 1 mill which was being erected and 1 mill which was projected. In the present edition we enumerate 42 completed and 2 building rail mills. A number of the completed mills make a specialty of rerolling or renewing old or partly worn-out steel rails.

Structural Mills.—The whole number of works which were equipped in November, 1907, to roll beams, beam girders, zee bars, tees, channels, angles, bridge rods, building rods, plates for bridge works, structural tubing, etc., was 68, as compared with 70 in June, 1904. In addition 3 mills were being built in November, 1907, as compared with 1 mill in June, 1904.

Wire Rods.—In June, 1904, we enumerated 33 completed mills which were equipped to roll wire rods. In November, 1907, we had exactly the same number of mills which were so equipped. In addition 1 wire-rod mill was projected on the latter date.

Iron and Steel Skelp Mills.—In the Directory for 1904 we enumerated 61 completed and 2 projected iron and steel skelp mills. In November, 1907, we had 57 completed skelp mills.

Plate and Sheet Mills.—In June, 1904, we had 157 completed, 2 building, 1 partly erected, and 4 projected plate and sheet mills. In the present Directory we enumerate 159 completed mills, 1 building, 2 partly erected, and 1 projected.

Black Plate Plants.—In June, 1904, we had 49 completed and 3 building plants for the manufacture of black plates or sheets for

tinning, while in November, 1907, we had 42 completed plants which were so equipped and 1 plant which was partly erected.

Tinplate and Terne Plate Works.—In June, 1904, we enumerated 53 completed tinplate and terne plate works, 2 building, and 1 projected. In the present Directory we enumerate but 43 completed works. In the intervening period 13 tinplate and terne plate plants were abandoned, dismantled, or removed to other sites.

Cut Nail Works.—In June, 1904, there were 23 rolling mills which were devoted in whole or in part to the manufacture of cut nails and cut spikes, equipped with 2,302 nail and spike machines. In November, 1907, there were 20 rolling mills which could make cut nails and cut spikes, equipped with 1,765 nail and spike machines, a loss of 537 machines. Works which do not roll nail plates but make cut nails and cut spikes from purchased plates are not included.

Wire Nail Works.—We enumerate in the present edition of the Directory 12 companies which operate rolling mills and which make wire nails. These companies have 30 wire-nail plants, which are equipped with 4,249 machines.

Natural Gas.—In the Directory for 1904 we enumerated 135 completed iron and steel works which then used natural gas for fuel and 2 in course of erection. In addition when completed 1 partly-erected and 1 rebuilding plant and 2 projected works would use natural gas. In November, 1907, the total number of works which used natural gas was 137 and in addition 1 works to use natural gas was partly erected, as follows: Pennsylvania, 90 (53 in Allegheny County and 37 in other parts of Western Pennsylvania); West Virginia, 14; Kentucky, 1; Ohio, 27 completed and 1 partly erected; and Indiana, 5.

Forges and Bloomaries.—The number of pig and scrap bloomaries which made iron blooms, billets, etc., for sale in June, 1904, was 8. The number of forges which made blooms direct from the ore was 1, located in New York. The number of pig and scrap bloomaries enumerated in November, 1907, which made blooms, billets, etc., for sale, was 11. On that date there were no active forges for making blooms direct from the ore; all had been abandoned.

Canada.—In December, 1904, there was presented in a Supplement to the 1904 edition of the Directory a complete description of the iron and steel works in Canada. The Dominion then had 16 completed blast furnaces with an annual capacity of 830,000 tons of basic, foundry, forge, and other kinds of pig iron and 18 completed and 3 building rolling mills and steel works with an annual capacity of 653,300 tons of steel ingots and castings and 839,600 tons of finished rolled and forged products. J. M. S.

SUMMARY BY STATES.

BLAST FURNACES.

STATES—Gross tons.	Completed Furnaces, November 1, 1907.				Annual Capacity of Completed Furnaces, November 1, 1907, in gross tons.			
	Anthracite.*	Bituminous.†	Charcoal.‡	Total.	Anthracite.*	Bituminous.†	Charcoal.‡	Total—Gross tons.
Massachusetts,			2	2			10,000	10,000
Connecticut,			3	3			15,000	15,000
New York,	6	18	2	26	288,000	1,908,000	15,000	2,211,000
New Jersey,	6	5		11	165,500	405,000		570,500
Pennsylvania,	48	109	5	162	1,861,900	12,556,000	14,300	14,432,200
Maryland,		4	1	5		500,000	6,000	506,000
Virginia,		22	4	26		885,000	33,500	918,500
West Virginia,		4		4		395,000		395,000
Kentucky,		7	1	8		275,000	3,000	278,000
Tennessee,		18	3	21		789,500	25,000	814,500
Georgia,		2	2	4		96,000	33,500	129,500
Alabama,		45	5	50		3,190,000	86,500	3,276,500
Texas,		3	1	4		97,000	15,000	112,000
Ohio,		60	6	66		6,402,000	26,200	6,428,200
Indiana,		1		1		125,000		125,000
Illinois,		24		24		2,920,000		2,920,000
Michigan,		2	11	13		130,000	368,000	498,000
Wisconsin,		6	1	7		335,000	45,000	380,000
Minnesota,		1		1		80,000		80,000
Missouri,		1	1	2		45,000	25,000	70,000
Colorado,		6		6		625,000		625,000
Washington,			1	1			24,000	24,000
Oregon,			1	1			15,000	15,000
Total,	60	338	50	448	2,315,400	31,758,500	760,000	34,833,900

* Includes 4 furnaces which use anthracite coal alone for fuel, 3 furnaces which use anthracite coal and coke mixed and occasionally coke alone, and 53 furnaces which use anthracite coal and coke mixed.

† Includes 10 furnaces which use coke and occasionally anthracite coal mixed with coke, 5 furnaces which use coke and raw coal, 1 furnace which uses coke principally but sometimes uses charcoal alone, and 322 furnaces which use coke alone.

‡ Includes one charcoal and coke mixed furnace and 49 charcoal furnaces.

In addition to the furnaces enumerated above 2 plants in New York, 1 in Pennsylvania, 1 in Virginia, 1 in West Virginia, 1 in Oregon, and 1 in California are equipped for the production by electricity of pig iron, ferro-chrome, ferro-silicon, ferro-tungsten, and other ferro alloys.

On November 1, 1907, there were 28 furnaces in course of erection, located in the following States: New York, 2 bituminous; Pennsylvania, 8 bituminous; Alabama, 1 bituminous; Ohio, 8 bituminous and 1 coke and raw coal; Indiana, 4 bituminous; Illinois, 2 bituminous; Michigan, 1 charcoal; and Wisconsin, 1 bituminous: total, 26 bituminous, 1 coke and raw coal, and 1 charcoal. In addition there were 29 furnaces which were projected, 2 of which were partly built and work on them indefinitely suspended and one to be revived, located in the following States: New York, 1 bituminous; Pennsylvania, 1 bituminous and 4 anthracite and coke (1 partly erected); Virginia, 1 bituminous (partly erected); Tennessee, 1 bituminous and 1 charcoal (the latter to be revived); Alabama, 3 bituminous; Ohio, 4 bituminous; and Indiana, 13 bituminous. There was also 1 projected electric plant in Idaho.

SUMMARY BY STATES.

ROLLING MILLS, STEEL WORKS, TINPLATE WORKS, ETC.

STATES.	Completed Rolling Mills and Steel Works.	Completed Iron and Steel Rolling Mills.*	Cut-Nail and Cut-Spike Machines.	Completed Steel Works.†						Tinplate and Terné Plate Works.	Pig and Scrap Bloomeries.‡
				Bessemer Works.	Tropenas Works.	Robert-Bessemer and Clapp-Griffiths.	Bookwalter and other Bessemer.	Open-hearth Works.	Crucible Works.		
Maine,	1	1	..	..	2	1	..	4	5	..	..
Massachusetts,	14	7	160	..	1	..	..	1	..	..	..
Rhode Island,	4	3	..	..	1	..	..	1	..	..	..
Connecticut,	8	6	..	..	1	..	..	3	2	..	..
New York,	30	22	..	1	2	..	..	10	6	2	1
New Jersey,	25	18	..	..	..	..	3	8	7	..	..
Pennsylvania,	256	208	739	11	5	..	4	76	33	21	8
Delaware,	8	6	..	..	..	..	1	2	..	..	..
Maryland,	5	5	..	1	..	..	..	1	..	1	1
District of Columbia,	2	..	..	..	1	..	..	1	..	..	..
Virginia,	5	4	..	..	1	..	..	1	..	..	..
West Virginia,	20	19	353	2	..	..	..	2	1	6	..
Kentucky,	8	8	126	1	..	..	..	..	..	..	..
Tennessee,	2	1	..	..	1	..	..	..	1	..	..
Georgia,	1	1	..	..	..	..	..	1	..	..	..
Alabama,	14	11	..	1	..	..	..	5	..	..	..
Texas,	1	1	..	..	..	..	..	..	..	..	..
Ohio,	80	64	246	8	2	1	1	17	3	6	1
Indiana,	26	19	..	..	..	..	..	6	1	4	..
Illinois,	35	23	126	3	1	..	3	9	5	2	..
Michigan,	13	4	..	..	1	1	..	3	4	1	..
Wisconsin,	16	3	..	1	..	..	2	4	10	..	..
Minnesota,	2	..	..	..	1	..	..	1	..	..	..
Missouri,	6	4	..	..	..	..	2	1	..	..	..
Kansas,	1	1	..	..	..	..	..	..	..	..	..
Colorado,	2	2	..	1	..	..	..	1	..	..	..
Wyoming,	1	1	..	..	..	..	..	..	..	..	..
Washington,	2	1	..	..	..	..	..	..	..	..	..
Oregon,	3	1	..	..	..	..	1	..	..	..	..
California,	7	4	15	..	1	..	..	2	1	..	..
Total,	598	448	1,765	30	20	3	17	159	79	43	11

* Excludes all steel works that are not equipped with hot trains of rolls.

† In addition to the Bessemer, Tropenas, Clapp-Griffiths, Robert-Bessemer, special Bessemer, open-hearth, and crucible steel works enumerated above 21 plants were equipped on November 1, 1907, for the production of McHaffie, blister, electric, and other special steel.

On November 1, 1907, there were 15 rolling mills and steel works being erected in the United States, as follows: New York, 2; Pennsylvania, 1; Delaware, 1; Virginia, 1; West Virginia, 1; Kentucky, 1; Indiana, 1; Illinois, 3; Michigan, 1; Washington, 1; and California, 2. In addition 2 plants in Ohio were partly erected but work upon their construction indefinitely suspended. On the same date 15 rolling mills and steel works were projected, as follows: Massachusetts, 1; New Jersey, 1; Pennsylvania, 5; Delaware, 1; Tennessee, 1; Indiana, 1; Idaho, 1; Washington, 1; Oregon, 1; and California, 2.

‡ No forges for making blooms, billets, etc., direct from iron ore are described in the active list in the present edition of the Directory; all have been abandoned or dismantled.

SUMMARY BY STATES.

CAPACITIES OF ROLLING MILLS AND STEEL WORKS.

STATES. Gross tons.	Rolling Mills.*		Bessemer Steel Works.†		Open-hearth Steel Works.†		Crucible Steel Works.†		Total annual capacity of ingots and cast- ings, in gross tons.‡
	Number of com- pleted works.	Annual capacity of finished roll- ed products.	Number of con- verters.	Annual capacity of ingots and castings.	Number of fur- naces.	Annual capacity of ingots and castings.	Number of works.	Annual capacity of ingots and castings.	
Maine,	1	30,000							
Mass.,	7	266,500	4	33,700	15	218,000	5	1,670	253,370
Rhode Island, ..	3	76,000	2	2,500	2	25,000			27,500
Connecticut, ..	6	246,000	1	1,300	6	91,400	2	7,600	100,300
New York, ...	22	1,680,500	7	852,200	34	1,004,000	8	32,260	1,888,460
New Jersey, ...	18	679,400	8	28,000	22	325,000	7	21,900	374,900
Pennsylvania, ...	208	15,016,630	42	5,673,400	457	11,170,000	33	196,300	17,039,700
Delaware, ...	6	104,000	4	6,000	8	170,000			176,000
Maryland, ...	5	570,000	3	500,000	2	35,000			535,000
Dist. of Col., ...			1	300	2	24,200			24,500
Virginia, ...	4	159,000	1	1,000	1	6,000			7,000
West Virginia, ...	19	679,450	4	390,000	4	59,000	1	7,500	456,500
Kentucky, ...	8	239,300	2	180,000	3	99,000			279,000
Tennessee, ...	1	50,000	1	3,000			1	600	3,600
Georgia, ...	1	50,000			2	45,000			45,000
Alabama, ...	11	956,000	††3		25	884,000			884,000
Texas, ...	1	15,000							
Ohio, ...	64	5,099,700	22	4,409,300	73	1,600,100	3	3,200	6,012,600
Indiana, ...	19	1,041,750			46	1,312,000	1	100	1,312,100
Illinois, ...	23	2,896,800	14	2,194,500	49	1,157,500	5	13,230	3,365,230
Michigan, ...	4	128,000	3	10,000	5	35,000	4	2,900	47,900
Wisconsin, ...	3	450,000	6	104,600	6	39,500	10	7,625	151,725
Minnesota, ...			1	1,000	1	4,200			5,200
Missouri, ...	4	145,000	4	25,000	11	88,000			113,000
Kansas, ...	1	100,000							
Colorado, ...	2	795,000	2	600,000	12	400,000			1,000,000
Wyoming, ...	1	20,000							
Washington, ...	1	15,000			1	10,000			10,000
Oregon, ...	1	12,000	1	1,200					1,200
California, ...	4	78,900	2	3,200	4	23,000	1	500	26,700
Total,	448	31,599,930	138	15,020,200	791	18,824,900	**81	295,385	34,140,485

* Includes all completed rolling mills but excludes all works not having hot rolls.

† Includes completed, building, and partly built Bessemer, open-hearth, and crucible plants.

‡ Includes 71 completed and 2 building standard Bessemer steel converters with an annual capacity of 14,818,000 tons of ingots and castings, 29 completed and 1 building Tropenas, 1 Clapp-Griffiths, 4 Bookwalter, 3 Robert-Bessemer, and 23 completed, 1 partly erected, and 3 building other special Bessemer converters with a total annual capacity of 202,200 tons.

§ Includes 203 completed, building, and partly erected acid open-hearth steel furnaces with an annual capacity of 2,273,400 gross tons of ingots and castings and 588 basic furnaces with an annual capacity of 16,551,500 tons of ingots and castings.

** Includes 79 completed crucible steel works with an annual capacity of 292,585 gross tons of ingots and castings and 2 building works with an annual capacity of 2,800 tons.

†† Converters used for desiliconizing and decarburizing metal for open-hearth furnaces.

‡‡ Does not include 21 McHaffie and other special steel works; annual capacity, 44,300 tons.

GRAND SUMMARY.

NUMBER AND CAPACITY OF IRON AND STEEL WORKS.	November, 1907.	June, 1904.
Number of completed Blast Furnaces—338 Bituminous, 56 Anthracite and Coke, 4 Anthracite alone, 49 Charcoal, and 1 mixed Charcoal and Coke: total,.....	448	428
Number of Electric Plants, (pig-iron, ferro-silicon, etc.),.....	7.	2
Number of Blast Furnaces building and rebuilding,.....	28	17
Annual capacity of the completed Blast Furnaces, gross tons,...	34,833,900	28,114,000
Annual capacity of the Bituminous Furnaces, gross tons,.....	31,758,500	24,242,500
Annual capacity of the Anthracite and Anthracite and Coke Furnaces, gross tons,.....	2,315,400	3,019,900
Annual capacity of the Charcoal Furnaces, gross tons,.....	757,800	851,600
Annual capacity of the mixed Charcoal and Coke Furnace,.....	2,200	.....
Number of completed Rolling Mills and Steel Works,.....	598	572
Number of building and rebuilding Rolling Mills and Steel Works,.....	15	13
Number of single Puddling Furnaces, (a double furnace counting as 2 single furnaces),.....	2,635	3,161
Number of Heating Furnaces,.....	3,971	3,995
Annual capacity in finished products of completed Rolling Mills, double turn, (omitting all forged products),.....	31,599,930	25,978,050
Number of Cut-nail Works connected with rolling mills,.....	20	23
Number of Cut-nail Machines in these works,.....	1,765	2,302
Number of completed standard Bessemer Steel Works,.....	30	32
Number of completed standard Bessemer Steel Converters,.....	71	75
Annual capacity of standard Bessemer Steel Converters (built and building) in ingots and direct castings, gross tons,...	14,818,000	13,551,000
Number of completed Tropenas Steel Works,.....	20	10
Number of completed Tropenas Converters,.....	29	14
Number of completed Robert-Bessemer Steel Works,.....	2	2
Number of completed Robert-Bessemer Converters,.....	3	3
Number of completed Clapp-Griffiths, Bookwalter, Wills, Zenzes, and other Special Bessemer Steel Works,.....	18	7
Number of completed Clapp-Griffiths, Bookwalter, Wills, Zenzes, and other Special Bessemer Converters,.....	28	11
Annual capacity of all kinds of Bessemer Converters (built, building, and partly erected) in ingots and castings, gross tons,...	15,020,200	13,628,600
Number of completed Open Hearth Steel Works,.....	159	135
Number of Open Hearth Steel Works building,.....	13	5
Number of Open Hearth Steel Furnaces—691 completed, 97 building, and 3 partly built: total,.....	791	577
Annual capacity of these Furnaces (built, building, and partly erected) in ingots and direct castings, gross tons,.....	18,824,900	11,335,100
Number of completed Crucible Steel Works,.....	79	57
Number of building Crucible Steel Works,.....	2	.....
Number of Steel-melting Pots in completed and building works,...	4,573	3,606
Annual capacity of these Pots in ingots and direct castings,...	295,385	226,610
Number of completed Tinplate and Terne Plate Works,.....	43	53
Number of building Tinplate and Terne Plate Works,.....	.....	2
Number of Forges making iron blooms, etc., direct from ore,.....	.....	1
Annual capacity in blooms, double turn, gross tons,.....	.....	6,000
Number of completed Pig and Scrap Bloomaries which make iron blooms, billets, etc., for sale,.....	11	8
Number of building Pig and Scrap Bloomaries,.....	.....	1
Annual capacity in blooms of completed and building Pig and Scrap Bloomaries which make iron blooms, billets, etc., for sale, double turn, gross tons,.....	64,200	41,300

THE IRON AND STEEL WORKS OF THE UNITED STATES.

PART I—CHIEFLY CONSOLIDATIONS.

PART I of the present edition of the Directory embraces descriptions of the United States Steel Corporation and of the operating companies and properties which are under its control; also of all the independent companies whose capitalization, lists of officers, etc., as well as the descriptions of their plants, often very elaborate, are naturally looked for in a prominent part of a volume of the scope of the Directory. Some companies which, through lack of information or from other causes, were included in Part II of the 1901 and 1904 editions of the Directory are now transferred to Part I. The descriptions in this division of the Directory embrace coal and iron-ore mines, coking plants, limestone quarries, natural gas wells, railroads, lake vessels, car-building works, etc., as well as the blast furnaces, rolling mills, steel works, forges and bloomeries, and tinplate and terne plate works.

THE UNITED STATES STEEL CORPORATION.

This Corporation does not operate any iron or steel works, iron-ore mines, coal mines, coke ovens, railroads, lake vessels, etc.

The United States Steel Corporation; business offices, Empire Building, 71 Broadway, New York. *Directors: term expires in 1908*—George F. Baker, William E. Corey, John F. Dryden, Clement A. Griscom, Marvin Hughitt, Daniel G. Reid, John D. Rockefeller, Jr., and Nathaniel Thayer; *term expires in 1909*—William Edenborn, Henry C. Frick, William H. Moore, Norman B. Ream, James H. Reed, Charles Steele, Peter A. B. Widener, and Robert Winsor; *term expires in 1910*—J. Pierpont Morgan, Henry Phipps, Henry H. Rogers, Thomas Morrison, Elbert H. Gary, George W. Perkins, Edmund C. Converse, and James Gayley. *Finance Committee: Elbert H. Gary, Chairman; George W. Perkins, Henry H. Rogers, Norman B. Ream, Peter A. B. Widener, Henry C. Frick, George F. Baker, Henry Phipps, and William E. Corey.*

Officers at New York: Elbert H. Gary, Chairman; William E. Corey, President; James Gayley, First Vice President; William B. Dickson, Second Vice President; W. R. Walker and John Reis, Assistants to President; Francis Lynde Stetson, General Counsel; Charles MacVeagh, General Solicitor; Richard Trimble, Secretary and Treasurer; and William J. Filbert, Comptroller.

Stock Transfer Departments: 51 Newark st., Hoboken, N. J., and 71 Broadway, New York. *Registrars of Stock:* For preferred stock, The New York Trust Company, New York; for common stock, Guaranty Trust Company, New York. General offices of the United States Steel Corporation, 51 Newark st., Hoboken, New Jersey.

Meetings: The annual meeting of the stockholders is held on the third Monday in April. The regular meeting of the Board of Directors is held on the last Tuesday in each month. Officers are elected by the Board at its first regular meeting following the annual meeting of the stockholders.

The United States Steel Corporation was incorporated on February 25, 1901, under the laws of the State of New Jersey. Its authorized capital stock is \$1,100,000,000, of which \$550,000,000 is 7 per cent. cumulative preferred and \$550,000,000 is common. It had outstanding on December 31, 1906, \$360,281,100 of preferred and \$508,302,500 of common stock. In addition it had outstanding on the date named, excluding bonds in the sinking fund, \$288,798,000 of 5 per cent. 50-year and \$166,202,500 of 5 per cent. 10-60-year collateral trust gold bonds. The total amount of preferred stock issued to December 31, 1902, amounted to \$510,281,100, but in 1903 an issue of \$250,000,000 of new bonds was authorized, of which \$200,000,000 were to be exchanged for preferred stock and \$50,000,000 were to be sold for cash. Of these bonds \$150,000,000 were exchanged for preferred stock, which was subsequently canceled, and \$20,000,000 were sold. The United States Steel Corporation owns practically all the stock of the following companies:

- * Carnegie Steel Company (of New Jersey),
- Federal Steel Company,
- National Tube Company,
- Shelby Steel Tube Company,
- American Steel and Wire Company of New Jersey,
- American Sheet and Tin Plate Company,
- American Bridge Company,
- Union Steel Company,
- Clairton Steel Company, and the
- Lake Superior Consolidated Iron Mines.

It also owns one-sixth of the stock of the Pittsburgh Steamship Company; the remaining five-sixths of the stock of that company is owned by the Carnegie Steel Company (of New Jersey). Complete details concerning the officials, properties, equipment, products, etc., of the companies named on page 2 will be found in the following pages, including the vessels owned or operated by the Pittsburgh Steamship Company, the iron-ore properties owned or controlled by the Oliver Iron Mining Company, the coke works operated by the H. C. Frick Coke Company, the cement plants operated by the Universal Portland Cement Company, the zinc works operated by the Edgar Zinc Company, and the coal mines, natural gas properties, railroads, etc., owned or operated by the subsidiary companies of the United States Steel Corporation.

MINNESOTA STEEL COMPANY.

All the stock of the Minnesota Steel Company will be owned by interests identified with the United States Steel Corporation.

Minnesota Steel Company; general offices, Wolvin Building, Duluth, Minn., and 71 Broadway, New York. *Officers at New York:* W. B. Dickson, President; Richard Trimble, Treasurer; and W. J. Filbert, Secretary and Auditor. *Officers at Duluth:* George L. Reis, Vice President, and George D. Swift, Assistant Secretary and Assistant Treasurer. Capital stock, \$10,000,000, all common.

The Minnesota Steel Company will erect, own, and probably operate an iron and steel plant at Duluth, Minn. The works will probably consist of a blast furnace with a daily capacity of about 400 tons, 6 large basic open-hearth steel furnaces, a blooming mill, a rail mill, sheet and bar mills, by-product coke ovens, coal storage facilities, etc.

RAILROADS OWNED OR OPERATED BY THE UNITED STATES STEEL CORPORATION.

On December 31, 1906, the subsidiary companies of the United States Steel Corporation owned or operated 850.91 miles of main line of standard-gauge railroads, 394.58 miles of branches and spurs, 271.96 miles of second track, 614.49 miles of sidings, and 391.28 miles of trackage rights, making a total of 2,523.22 miles. They also owned or operated 768 locomotives, 113 passenger and mail cars, and 34,478 ore, coal, coke, box, and other freight cars.

CARNEGIE STEEL COMPANY (OF NEW JERSEY).

All the stock of the Carnegie Steel Company (of New Jersey) is owned by the United States Steel Corporation.

Carnegie Steel Company (of New Jersey); general offices, Carnegie Building, Pittsburgh; principal offices in the State of New Jersey, No. 51 Newark st., Hoboken; the Hudson Trust Company is designated as agent therein and in charge thereof.

The Carnegie Steel Company (of New Jersey) came into existence through the merger in March, 1903, of the Carnegie Company, the National Steel Company, and the American Steel Hoop Company, all of New Jersey. All of the properties and other assets and all of the liabilities of the three merged companies were transferred by virtue of the merger to the Carnegie Steel Company (of New Jersey).

Capital stock of the company, \$65,250,000, all common.

Officers: A. C. Dinkey, President; James H. Reed, Chairman of Board of Directors; H. P. Bope, First Vice President; W. W. Blackburn, Second Vice President and Secretary; James J. Campbell, Auditor and Assistant Secretary; W. C. McCausland, Treasurer; W. R. Conrad, Assistant Treasurer; and Samuel A. Benner, General Manager of Sales.

Sales Agencies: Candler Building, Peach Tree, Houston, and Pryor sts., Atlanta; Telephone Building, 125 Milk st., Boston; 203A Ellicott Square, Buffalo; Commercial National Bank Building, Chicago; Union Trust Building, Fourth and Walnut sts., Cincinnati; Rockefeller Building, corner Bank and Superior sts., Cleveland; Equitable Building, Seventeenth and Champa sts., Denver; Union Trust Building, 102 Griswold st., Detroit; Hennen Building, Carondelet and Common sts., New Orleans; Empire Building, 71 Broadway, New York; Pennsylvania Building, Fifteenth and Chestnut sts., Philadelphia; Ainsworth Building, 73½ Third st., Portland, Oregon; Boyd Building, 226 Market st., San Francisco; Mutual Life Building, Seattle, State of Washington; Chemical Building, Olive and Eighth sts., St. Louis; Pioneer Press Building, Robert and Fourth sts., St. Paul; and National Safe Deposit Building, 1429 New York ave., Washington, D. C.

The foreign sales agencies of the Carnegie Steel Company (of New Jersey) were transferred on November 1, 1903, to the United

States Steel Products Export Company, Battery Park Building, 21 State st., New York.

Plants Operated: The Carnegie Steel Company (of New Jersey), in addition to the plants which were formerly owned and operated by the National Steel Company and the American Steel Hoop Company, and which it now owns, operates, by virtue of its ownership of all of the stock of the Carnegie Steel Company (of Pennsylvania), and under a formal agreement with that company, all of the plants which are owned by the Carnegie Steel Company (of Pennsylvania). It also operates the blast furnaces, open-hearth steel furnaces, and blooming and plate mill departments of the South Sharon Works of the Union Steel Company; it also operates what are known as the Donora Steel Works and Donora Furnaces of the Union Steel Company, at Donora, Pa., which include blast furnaces, open-hearth steel furnaces, and a blooming mill; it also operates the blast furnaces, rolling mills, and steel works of the Clairton Steel Company, at Clairton, Pa., and the Steubenville Furnace of the National Tube Company, at Steubenville, Ohio; also the by-product coke ovens of the Sharon Coke Company, at South Sharon, Pa.

In addition the Carnegie Steel Company (of New Jersey) owns all the capital stock of the Carnegie Steel Company (of Pennsylvania), the Carnegie Natural Gas Company, the Bessemer and Lake Erie Railroad Company, (lessee of the Pittsburgh, Bessemer, and Lake Erie Railroad Company,) the Mingo Coal Company, the Pittsburgh and Conneaut Dock Company, the Union Railroad Company, the Mount Pleasant Water Company, the Youghiogheny Northern Railway Company, the Union Supply Company, the Chapin Mining Company, the Winthrop Iron Company, the Oliver Iron Mining Company, the Columbus Stone Company, the Carnegie Land Company, the Conneaut Land Company, and the Etna and Montrose Railroad Company.

It also owns a controlling interest in the Pittsburgh, Bessemer, and Lake Erie Railroad Company, one-half of the capital stock of the Pewabic Company, five-sixths of the capital stock of the Pittsburgh Steamship Company, 75 per cent. of the capital stock of the Pittsburgh Limestone Company, Limited, $74\frac{1}{2}$ per cent. of the capital stock of the H. C. Frick Coke Company, 25 per cent. of the capital stock of the Biwabik Mining Company, 25 per cent. of the capital stock of the G. W. Johnson Limestone Company, 25 per cent. of the capital stock of the Lawrence Limestone Company, 25 per cent. of the capital stock of the N. Y., P., and O. Dock Company, 20 per cent. of the capital stock of the Mahoning Ore and Steel Company, 52 per cent. of the capital stock of the

Pennsylvania and Lake Erie Dock Company, 50 per cent. of the capital stock of the Union Ore Company, two-thirds of the capital stock of the National Mining Company, 51 per cent. of the capital stock of the Mahoning Limestone Company, 20 per cent. of the capital stock of the Cambria Steamship Company, over 53 per cent. of the capital stock of the Trotter Water Company, 75 per cent. of the capital stock of the Peoples Supply Company, Limited, and two-thirds of the capital stock of the Isabella Limestone Company.

The Carnegie Steel Company (of New Jersey) operates the following blast furnaces, rolling mills, steel works, foundries, etc.:

BLAST FURNACES—55 COMPLETED AND 4 BUILDING.

Bellaire Furnaces, Bellaire, Ohio. Two stacks: one, 76 x 19, built in 1873, blown in September 22, 1873, and rebuilt in 1886; and one, 75 x 19, built in 1894-5 and blown in March 7, 1895; eight Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 250,000 tons. Equipped with one pig-iron casting machine.—*Both active in 1907.*

Carrie Furnaces, Rankin, Pennsylvania. Seven stacks, two of which were built by the Carrie Furnace Company and 5 by the Carnegie Steel Company. No. 1, 93 x 19½, removed from Ohio in 1883, blown in February 29, 1884, and rebuilt in 1893 and 1901; No. 2, 93 x 19½, built in 1888-9, blown in July 19, 1889, and rebuilt in 1895 and 1901-2; No. 3 and No. 4, each 100 x 23, commenced building in November, 1899; No. 3 completed in 1901 and blown in February 25 of the same year and No. 4 completed in 1901 and blown in April 24 of the same year; No. 5, 85 x 20, built in 1902-3 and blown in April 10, 1903; No. 6 and No. 7, each 85 x 22, construction commenced January 30, 1906; No. 6 completed and blown in June 4, 1907, and No. 7 completed and blown in August 3, 1907. Each furnace has four 3-pass Massicks & Crooke stoves; sizes: Nos. 1 and 2, 85 x 19½; Nos. 3 and 4, 100 x 21; and Nos. 5, 6, and 7, 90 x 21. Fuel, Connellsville coke; ore, Lake Superior; product, basic pig iron; total annual capacity, 1,075,000 tons. The Carrie Furnaces are equipped with 4 Heyl & Patterson pig-iron casting machines. Molten metal from these furnaces is shipped direct to the open-hearth furnaces at the Homestead Steel Works.—*All active in 1907.*

Clairton Furnaces, Clairton, Pa. Three stacks, each 85 x 21; started by the St. Clair Furnace Company in 1901 and completed by the Clairton Steel Company in 1903. No. 1 blown in April 21, 1903, No. 2 June 14, 1903, and No. 3 December 8, 1904; twelve

Massicks & Crooke stoves, each 95 x 21; fuel, coke; ores, Mesabi and old range from Minnesota and Michigan; product, basic pig iron; total annual capacity, 460,000 tons. (Operated by the Carnegie Steel Company (of New Jersey); owned and formerly operated by the Clairton Steel Company.)—*All active in 1907. See page 76.*

Columbus Furnaces, Columbus, Ohio. Two stacks: one, 75 x 18½, completed in November, 1873, and rebuilt in 1892, 1895, and 1900, has three Massicks & Crooke stoves, each 65 x 18; and one, 80 x 18½, built in 1897 and first blown in August 12, 1897, has three Massicks & Crooke stoves, each 75 x 19½; fuel, Pocahontas and Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 180,000 tons.—*Both active in 1907.*

Donora Furnaces, Donora, Pa. Two stacks, Nos. 1 and 2, each 85 x 22, built in 1902-4; No. 1 blown in January 3, 1905, and No. 2 February 7, 1905; eight Kennedy stoves, each 100 x 24; fuel, Connellsville coke; ore, Lake Superior; product, basic open-hearth pig iron; total annual capacity, 300,000 tons. Equipped with 2 Heyl & Patterson pig-iron casting machines. (Built and owned by the Union Steel Company; operated by the Carnegie Steel Company (of New Jersey).)—*Both active in 1907. See page 70.*

Duquesne Furnaces, Cochran, (post-office address, Duquesne,) Pa. Four completed and 2 building stacks. Completed stacks built by the Carnegie Steel Company, Limited: Nos. 1 and 3, each 100 x 22, and Nos. 2 and 4, each 100 x 23; sixteen Kennedy-Cowper stoves, each 97 x 21; No. 2 rebuilt in 1903. First blasts: No. 1, June 8, 1896; No. 2, October 7, 1896; No. 3, May 7, 1897; and No. 4, June 21, 1897. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and basic pig iron; total annual capacity, 750,000 tons. Equipped with one Uehling pig-iron casting machine. Molten metal from these furnaces is used in the Bessemer converters and open-hearth furnaces at the Duquesne Steel Works. Building stacks: Nos. 5 and 6, each to be 95 x 22; construction commenced December 1, 1906; each stack is being equipped with four 3-pass Massicks & Crooke stoves; fuel, coke; ore, Lake Superior; product, Bessemer and basic pig iron; annual capacity, 325,000 tons.—*Completed furnaces all active in 1907. No. 5 (building) to be ready for blast in January and No. 6 (building) in April, 1908.*

Edgar Thomson Furnaces, Bessemer, (post-office address, Braddock,) Pa. Eleven stacks, 4 built by the Edgar Thomson Steel Company, Limited, 5 by Carnegie Brothers & Co., Limited, and

2 by the Carnegie Steel Company (of Pennsylvania). Furnace A, 81 x 16, has four fire-brick stoves, three 91 x 18 and one 75 x 18; Furnace B, 85 x 21, has four fire-brick stoves, two 76 x 20, one 91 x 21, and one 76 x 21; Furnace C, 85 x 21, has four fire-brick stoves, each 90 x 21; Furnace D, 90 x 22, and Furnace E, 91 x 22, have eight fire-brick stoves, each 91 x 21; Furnaces F and G, each 90 x 21½, have seven fire-brick stoves, each 91 x 21; Furnace H, 91 x 22, and Furnace I, 91 x 23, have seven fire-brick stoves, each 91 x 21; and Furnaces J and K, each 90 x 22, have eight fire-brick stoves, each 98 x 21. Furnace C was rebuilt in 1903 and Furnace B in 1904. First blasts: A, January 3, 1880; B, April 4, 1880; C, November 4, 1880; D, April 18, 1882; E, June 28, 1882; F, October 19, 1886; G, June 21, 1887; H, March 1, 1890; I, August 17, 1890; J, February 16, 1903; and K, December 5, 1902. Fuel, Connellsville coke; ores, Lake Superior and foreign; product, Bessemer and basic pig iron and spiegeleisen and ferromanganese; total annual capacity, 1,460,000 tons. The Edgar Thomson Furnaces are equipped with 7 Uehling pig-iron casting machines. Molten metal from the furnaces is used in the Bessemer converters at the Edgar Thomson Steel Works.—*All active in 1907.*

Isabella Furnaces, Etna, Pa. Three stacks: Nos. 1 and 2 built in 1872 and No. 3 built in 1890; No. 1, 90 x 21, rebuilt in 1902, has four Kennedy stoves, each 90 x 21; No. 2, 80 x 19, rebuilt in 1900 and again in 1906, has four Kennedy stoves, each 90 x 21; and No. 3, 90 x 21, rebuilt in 1901-2, has four Kennedy stoves, each 90 x 21. Fuel, coke; ore, Lake Superior; product, Bessemer, foundry, mill, and basic pig iron and spiegeleisen and ferromanganese; total annual capacity, 430,000 tons. The furnaces are equipped with one pig-iron casting machine and a Gayley dry-blast plant.—*All active in 1907.*

Lucy Furnaces, Fifty-first st., Pittsburgh, on the Allegheny Valley Railway. Built by the Lucy Furnace Company and enlarged by Carnegie, Phipps & Co., Limited. Two stacks, Nos. 1 and 2, each 85 x 20; No. 2 rebuilt in 1898; eight fire-brick stoves, each 75 x 21. First blasts: No. 1, May 18, 1872, and No. 2, September 27, 1877. Fuel, Connellsville coke; ores, Lake Superior and foreign; product, Bessemer, basic, forge, low-phosphorus, and foundry pig iron and spiegeleisen and ferromanganese; total annual capacity, 240,000 tons. Equipped with one Uehling pig-iron casting machine.—*Both active in 1907.*

Mingo Furnaces, Mingo Junction, Ohio. Four stacks: No. 1, (formerly known as No. 2), 75 x 17, built in 1872 and rebuilt in 1886 and 1900-1; four Gordon-Whitwell-Cowper stoves, each 65½ x 19.

No. 2, 106½ x 23, built in 1900-1 and blown in in June, 1901; four Massicks & Crooke stoves, each 85 x 21. No. 3, 106½ x 23, built in 1900-1 and blown in April 28, 1901; four Massicks & Crooke stoves, each 85 x 21. No. 4, 90 x 21½, built in 1905-6 and blown in January 21, 1906; four Massicks & Crooke stoves, each 100 x 21. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 500,000 tons. Equipped with 3 Heyl & Patterson pig-iron casting machines. Molten metal from these furnaces is used in the Bessemer converters at the Mingo Steel Works.—*All active in 1907.*

New Castle Furnaces, New Castle, Pa. Four stacks: Furnace No. 1, one stack, 97 x 20, built in 1872, first put in blast in June, 1873, and rebuilt in 1893; old furnace torn down in 1897 and rebuilt and blown in in the same year; five Massicks & Crooke stoves, four 85 x 18 and one 85 x 21. Furnace No. 2, one stack, dismantled in 1903; a modern furnace, 94½ x 21, erected on the site of the old stack in 1903-4 and blown in December 8, 1904; four Massicks & Crooke stoves, each 85 x 21. Furnace No. 3, one stack, dismantled in 1903 and rebuilt in 1903-4; present size, 94½ x 21; four Massicks & Crooke stoves, each 85 x 20. Furnace No. 4, one stack, 106½ x 21, built in 1900-1 and first put in blast in July, 1901; four Cowper-Kennedy stoves, each 85 x 20, and one Massicks & Crooke stove, 85 x 21. Fuel, coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 630,000 tons. The New Castle Furnaces are equipped with 2 Heyl & Patterson pig-iron casting machines. Molten metal from the furnaces is used in the Bessemer converters at the New Castle Steel Works.—*All active in 1907.*

Niles Furnace, Niles, Ohio. One stack, 76 x 18½; original stack built in 1870, enlarged in 1883, and torn down and rebuilt in 1890; entirely new equipment; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 90,000 tons.—*Active in 1907.*

Ohio Furnaces, Youngstown, Ohio. Four completed stacks and 2 stacks building. Two of the completed stacks are 106½ x 23 and two are 90 x 23: Nos. 1 and 2, built in 1899-1900, have each four Cowper-Kennedy-Roberts stoves, each 118 x 21; No. 3, built in 1900-1, has four Massicks & Crooke stoves, each 118 x 21; and No. 4, built in 1903-4, has four Cowper-Kennedy-Roberts stoves, each 118 x 21. First blasts: No. 1, February 15, 1900; No. 2, June 7, 1900; No. 3, March 29, 1901; and No. 4, September 6, 1904. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 750,000 tons. Equipped with 2 pig-iron casting machines. Molten metal from these furnaces is

used in the Bessemer converters at the Ohio Steel Works. Building stacks, to be known as Nos. 5 and 6, and each to be 95 x 23; construction commenced January 23, 1907; each stack is being equipped with four Kennedy-Cowper hot-blast stoves, each 118 x 21, and will be blown with blast furnace gas engines; fuel, Connellsville coke; ores, Mesabi and old range; product, Bessemer pig iron; annual capacity, 365,000 tons.—*Completed furnaces all active in 1907; building furnaces to be ready for blast in February, 1908.*

Sharon Furnace, Sharon, Pa. One stack, 75 x 17, built in 1866 and rebuilt in 1883; one Cowper-Kennedy and three Whitwell stoves; fuel, coke; ore, Lake Superior; product, basic open-hearth pig iron; annual capacity, 90,000 tons.—*Active in 1907.*

South Sharon Furnaces, South Sharon, Pa. Three stacks: No. 1, one stack, 100 x 22, built in 1900-1 and blown in December 8, 1901; No. 2 and No. 3, two stacks, each 79 x 20, built in 1902-4; No. 2 blown in September 9, 1904, and No. 3 November 27, 1904; No. 1 has four Cowper-Kennedy stoves, each 111 x 22, and Nos. 2 and 3 have each four Cowper-Kennedy stoves, each 90 x 22. Fuel, coke; ore, Lake Superior; product, basic pig iron; total annual capacity, 450,000 tons. Equipped with 2 double-strand Heyl & Patterson pig-iron casting machines. Molten metal from these furnaces is used in the open-hearth department of the South Sharon Steel Works. (Built by the Sharon Steel Company; now owned by the Union Steel Company but operated by the Carnegie Steel Company (of New Jersey).)—*All active in 1907. See pages 70-71.*

Steubenville Furnace, Steubenville, Ohio. One stack, 75 x 17, built in 1872 and rebuilt in 1886; remodeled in 1901; three Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 60,000 tons. (Owned and formerly operated by the National Tube Company; now operated for it by the Carnegie Steel Company (of New Jersey).)—*Active in 1907. See page 37.*

Zanesville Furnace, Zanesville, Ohio. One stack, 75 x 16, built in 1870-1; blown in September 7, 1871; rebuilt in 1883; three Whitwell stoves, each 65 x 17, and one Kennedy stove, 70 x 18; fuel, Pocahontas coke; ore, Lake Superior; product, ferro-silicon and Bessemer pig iron; annual capacity, 52,000 tons.—*Active in 1907.*

Total annual capacity of the 55 completed furnaces, 7,767,000 gross tons of pig iron, spiegeleisen, and ferromanganese; of the 4 building furnaces, 690,000 tons: total, 8,457,000 tons.

ROLLING MILLS AND STEEL WORKS—22.

Bellaire Steel Works, Bellaire, Ohio. Rolling mill built in 1867 and put in operation in February, 1868; remodeled in 1893 and rebuilt

in 1895; 3 trains of 24-inch rolls with 5 roller-driven and chain transfer tables. Bessemer steel works built in 1883-4 and rebuilt in 1897; 4 cupolas, two 10-gross-ton converters, 4 soaking pits, and one 32-inch blooming mill; first blow made April 28, 1884; annual capacity, 400,000 tons of ingots; product, soft steel blooms, billets, slabs, and sheet and tinplate bars; annual capacity, 350,000 tons. Fuel, coal and natural gas. A foundry connected with the works has an annual capacity of 1,600 tons of iron, brass, and steel castings for the consumption of the company.

Clairton Steel Works, Clairton, Pa. Built in 1901-2 by the St. Clair Steel Company and the Clairton Steel Company; first put in operation September 8, 1902; twelve 50-gross-ton Siemens open-hearth steel furnaces (one acid and 11 basic); first acid steel made September 8 and first basic steel September 11, 1902; 20 soaking pits and 4 trains of rolls (one 40-inch blooming, one 28-inch billet, one 22-inch structural, and one 18-inch bar); bar and structural mills added in 1905; first bars rolled July 27, 1905, and first structural shapes rolled November 30, 1905; product, ingots, billets, blooms, slabs, structural shapes, and merchant bars; also forging blooms and forging billets; annual capacity, 35,000 tons of acid and 450,000 tons of basic ingots, 400,000 tons of blooms, billets, and slabs, 90,000 tons of merchant bars, and 100,000 tons of structural shapes. Fuel, natural gas in open-hearth furnaces and soaking pits and bituminous coal under boilers. Work on 2 additional structural mills (one 14 and one 22-inch) was commenced in February, 1907; the 14-inch mill will probably be ready for operation about August 15 and the 22-inch mill about October 1, 1907. (Formerly operated by the Clairton Steel Company; owned by the Clairton Steel Company.)—*See pages 76-77.*

Clark Mill, Thirty-fifth street, Allegheny Valley Railway, and Allegheny river, Pittsburgh. Built in 1869; 7 heating furnaces and 6 trains of rolls (two 8, one 9, one 10, one 12, and one 20-inch); product, hoop, band, box, and scroll steel, cotton-ties, skelp, and rounds, squares, ovals, and half ovals; annual capacity, 75,000 tons. Fuel, natural gas and coal. Brand, for export only, "Carnegie. U. S. A."

Columbus Steel Works, Columbus, Ohio. Built in 1894-5 and put in operation May 2, 1895; 4 cupolas, two 4½-gross-ton Bessemer steel converters with an annual capacity of 200,000 tons, 2 soaking pits, and 2 trains of rolls (one 32-inch reversing blooming and one 24-inch sheet bar and small billet); product, steel blooms, slabs, billets, and sheet bars; annual capacity, 160,000 tons. Fuel, coal and natural gas.

Donora Steel Works, Donora, Pa. Built in 1902-3; twelve 50-gross-ton Siemens basic open-hearth steel furnaces with an annual ca-

capacity of 500,000 tons of ingots, four 4-hole soaking pits, and one 40-inch blooming mill; first steel made February 7, 1905, and first products rolled March 2, 1905; product, billets, blooms, and slabs; also forging blooms and forging billets; annual capacity, 450,000 tons of blooms. Fuel, natural gas. Adding one 3-high 30-inch billet mill, for the manufacture of 4 x 4-inch billets, and 4 soaking pits; estimated annual capacity, 400,000 tons; this mill will probably be ready for operation in August, 1907. (Owned by the Union Steel Company.)—See page 71.

Duquesne Steel Works, Cochran, (post-office address, Duquesne,) Pa. Built in 1886-8 by the Allegheny Bessemer Steel Company and capacity increased in 1891-2 by Carnegie Brothers & Co., Limited; enlarged in 1907; first blow made in Bessemer steel converters in February, 1889, and first steel rolled in March, 1889; first open-hearth steel made in October, 1900; two 10-gross-ton Bessemer converters, fourteen 50-gross-ton basic open-hearth steel furnaces, one 50-ton metal mixer, 36 soaking pits, 13 trains of rolls, (one 8, two 10, one 13, two 14, one 21, one 22, one 26, two 28, one 38, and one 40-inch,) one bar reel, and 3 machines for making twisted bars for concrete work; product, billets, blooms, slabs, sheet bars, splice bars, and merchant bars; also make forging blooms and forging billets; annual capacity, 625,000 tons of Bessemer steel ingots, 500,000 tons of open-hearth steel ingots, 1,200,000 tons of blooms, slabs, large and small billets, sheet bars, and splice bars, 300,000 tons of merchant bars, and 15,000 tons of twisted bars for concrete work. Fuel, natural gas and coal. Molten metal is taken from the Duquesne Furnaces to the metal mixer and thence conveyed to the Bessemer converters in ladles; it is also taken direct from the Duquesne Furnaces to the open-hearth furnaces. Eighteen additional 60-gross-ton basic open-hearth steel furnaces are being built. Three continuous heating furnaces, three 4-hole soaking pits, and 2 trains of merchant rolls (one 10 and one 16-inch) are to be added in 1907; the 10-inch finishing train which was formerly in the Monessen Mill is being installed in the Duquesne Steel Works; estimated annual capacity, 130,000 tons of large rounds and merchant bars.—*The two Bessemer converters above described will probably be dismantled in the fall of 1907.*

Edgar Thomson Steel Works, Bessemer, (post-office address, Braddock,) Pa. Built in 1873 by the Edgar Thomson Steel Company, Limited, and enlarged by Carnegie Brothers & Co., Limited, and the Carnegie Steel Company; first blow made in Bessemer steel converters August 26, 1875, and first steel rail rolled September 1, 1875; four 15-gross-ton Bessemer steel converters, 4 spiegel

cupolas, two 50-ton metal mixers, 8 pit furnaces, (40 holes,) 7 Siemens heating furnaces, and one 3-high 40-inch blooming and two 3-high rail trains (one 23 and one 27-inch); equipment for finishing rails at a low temperature, hot saws, and finishing machinery. One 18-inch light rail mill added in 1905 and equipped with 2 continuous heating furnaces, three 3-high and one 2-high motor-driven roll trains, hot saws, and finishing machinery; all tables, trains of rolls, and machinery connected with the 18-inch mill are motor driven. Connected with the works are iron and brass foundries; also a forge containing 2 heating furnaces and one 6-ton hammer. Product, light and heavy Bessemer steel rails, billets, sheet bars, and iron and brass castings; annual capacity, 1,000,000 tons of steel ingots, 850,000 tons of light and heavy steel rails, billets, and sheet bars, and 150,000 tons of iron and brass castings, including 136,000 tons of moulds and stools. Fuel, natural gas. Molten metal is taken from the Edgar Thomson Furnaces to the metal mixers and thence conveyed to the Bessemer converters in ladles.

Greenville Mill, Greenville, Pa. Built in 1871; entirely destroyed by fire January 11, 1906; rebuilt immediately and operations resumed February 15, 1906; 4 heating furnaces and 3 trains of rolls (one 8-inch guide, one 8 and 10-inch tandem, and one 10-inch merchant bar); product, steel bars and shapes; annual capacity, 50,000 tons. Fuel, coal. (The puddling department formerly connected with these works was not rebuilt.)

Homestead Steel Works, Munhall, Allegheny county, Pa. Bessemer steel department built in 1880-1 by the Pittsburgh Bessemer Steel Company, Limited; rebuilt and enlarged by Carnegie, Phipps & Co., Limited, in 1892; first blow made March 19, 1881; first steel rail rolled August 9, 1881. Open-hearth steel department built by Carnegie, Phipps & Co., Limited, and the Carnegie Steel Company, Limited; first acid open-hearth steel made October 27, 1886, and first basic open-hearth steel made in December, 1886; 7 furnaces completed in October, 1886; one in July, 1890; 8 in September, 1890; 4 in September, 1895; 5 in April and 5 in May, 1898; 5 in June, 5 in July, and 4 in December, 1899; 4 in March, 1900; 2 in December, 1902; and 10 in July and August, 1906. Two 10-gross-ton Bessemer steel converters and sixty basic open-hearth steel furnaces (three 20, twenty-three 40, twenty-four 45, and ten 55-gross-ton); one 200-gross-ton metal mixer; one 28 and one 38-inch reversing blooming mill; one 3-high 33-inch and one 40-inch reversing cogging mill; one 32-inch and one 30-inch universal slabbing mill; one 23-inch, one 33-inch, and one 3-high 35-inch structural mill; one 72-inch, one 84-inch, one 128-inch, and one

140-inch 3-high sheared plate mill; one 48-inch and one 42-inch universal plate mill; and one 10-inch guide mill; 109 heating pits and 36 heating furnaces; one beam fitting shop; one steel foundry with an annual capacity of 3,300 tons of steel castings; one armor-plate plant, consisting of a press shop, with one 12,000-ton and one 10,000-ton forging press and 12 heating furnaces, a carbonizing shop with 13 furnaces, and a machine shop for finishing armor plate; also a protective deck-plate plant with one 2,000-ton press and 3 heating furnaces. Product, blooms, billets, slabs, structural shapes, structural work, boiler plates, ship plates, tank plates, universal plates, railroad ties, armor plates, and open-hearth steel castings; also forging blooms and forging billets; annual capacity, 500,000 tons of Bessemer steel ingots, 2,050,000 tons of basic open-hearth steel ingots, 1,665,000 tons of blooms, billets, and slabs, (of which about 125,000 tons are not rolled into finished forms at these works,) 450,000 tons of structural shapes, 30,000 tons of structural work, 855,000 tons of boiler, ship, tank, and universal plates, 35,000 tons of railroad ties, 37,000 tons of other rolled products, 3,300 tons of open-hearth steel castings, and 10,000 tons of finished armor plates. Fuel, coal, coke, and natural gas. Molten metal is taken in part from the Carrie Furnaces to the metal mixer at these works and thence conveyed to the open-hearth furnaces in ladles.

Howard Axle Works, Homestead, Pa. Built by the Carnegie Steel Company in 1899-1900; operations commenced in April, 1900; one 24-inch train of rolls with 3 continuous heating furnaces, twelve 7,000-pound steam hammers, 3 axle-straightening presses, 32 axle cutting off and centering machines, and 27 axle-turning lathes; product, car and locomotive axles; annual capacity, 165,000 tons. Fuel, coal.

Lower Union Mill, Youngstown, Ohio. Built in 1863, 1874, and 1890; 6 heating furnaces and 5 trains of rolls (one 8-inch continuous, one 10-inch merchant, one 8-inch guide, and one 7 and one 16-inch finishing); product, steel merchant bars, channels, and shapes; annual capacity, 120,000 tons. Fuel, coal.

Lower Union Mills, Twenty-ninth street, Pittsburgh, on the Allegheny Valley Railway. Built in 1861-2 by Kloman & Phipps and enlarged by Wilson, Walker & Co., Limited, and by Carnegie, Phipps & Co., Limited; 10 heating furnaces, 4 trains of rolls, (one 9, one 12, one 15, and one 72-inch,) 5 forge fires, 7 forge furnaces, 8 hammers, (400 to 8,000 pounds,) and 4 spring-pointing machines; product, sheared plates, forgings, and bar steel; annual capacity, 125,000 tons of rolled and 2,400 tons of forged products. Fuel, natural gas, coal, and oil.

McCutcheon Mill, 88 Rebecca st., Allegheny. Built in 1862; 6 heating furnaces and 5 trains of rolls (one 16-inch angle, one 8-inch continuous, and two 8 and one 10-inch finishing); product, hoops, bands, cotton-ties, light angles, small bar sections, and 8, 10, and 12-pound rails; also slack barrel hoops; annual capacity, 110,000 tons of finished rolled products and 10,000 tons of hoops. Fuel, coal. Brand, for export only, "Carnegie. U. S. A."

Mingo Steel Works, Mingo Junction, Ohio. Present plant formed by the consolidation of the Mingo Mill of the former American Steel Hoop Company and the Mingo Works of the former National Steel Company. The Mingo Mill was built in 1882, first put in operation November 1, 1882, and remodeled in 1895; it originally made steel cut nails and spikes. The Mingo Works were built in 1885-6 and were equipped with Bessemer converters; first blow made February 8, 1886. The present plant was built in 1898-9; it contains two 10-gross-ton Bessemer steel converters; first blow made in July, 1899; one 150-ton metal mixer, three 4-hole soaking pits, 2 gas heating furnaces, one 36-inch direct-coupled and one 32-inch gear-driven blooming mill, one Kennedy continuous mill, and one 10-inch continuous Morgan bar mill; product, ingots, blooms, billets, slabs, sheet and tinplate bars, and steel merchant bars; annual capacity, 450,000 tons of ingots, 400,000 tons of blooms, billets, and slabs, 150,000 tons of sheet bars, and 45,000 tons of merchant bars. Fuel, coal and producer gas. Molten metal is taken from the Mingo Furnaces to the metal mixer and thence conveyed to the Bessemer converters in ladles.

Monessen Mill, Monessen, Pa. Built in 1898-9 and first put in operation March 24, 1899; 2 continuous charging gas heating furnaces and 3 trains of rolls (one 20-inch breakdown and one 8 and one 10-inch finishing); product, steel hoops, bands, and cotton-ties; annual capacity, 45,000 tons. Fuel, natural gas.—*The 10-inch finishing train is being re-erected at the Duquesne Steel Works.*

New Castle Steel Works, New Castle, Pa. Two 8-gross-ton Bessemer steel converters built in 1892 and first blow made November 2, 1892; converters enlarged to 12 tons in 1902; annual capacity, 650,000 tons of ingots; one 225-ton metal mixer, five 4-hole soaking pits, one 36-inch blooming mill, and one finishing mill, the latter consisting of 2 mills of 9 trains of rolls each driven by four engines; product, 8-inch tinplate and sheet bars and billets; annual capacity, 575,000 tons. Fuel, coal and producer gas. Molten metal is taken from the New Castle Furnaces to the metal mixer and thence conveyed to the Bessemer converters in ladles.

Ohio Steel Works, Youngstown, Ohio. Built in 1893-4; two 10-gross-ton Bessemer steel converters; first steel made February 4,

1895; two 250-ton metal mixers, six 4-hole soaking pits, 5 trains of rolls, (one 3-high 43-inch blooming, three 23-inch roughing and finishing, and one 15-inch Morgan continuous,) and one 1,500-lb. hammer; first steel rail rolled May 14, 1900; product, sheet and tinplate bars, slabs, billets to 1½ inches square, and T rails; annual capacity, 725,000 tons of ingots, 600,000 tons of rails, or 900,000 tons of billets and sheet and tinplate bars. Fuel, coal and producer gas. Molten metal is taken from the Ohio Furnaces to the metal mixers and thence conveyed to the Bessemer converters in ladles. Adding one 3-high 40-inch blooming mill with an annual capacity of 540,000 tons; will probably be ready for operation in January, 1908; also adding twelve 50-gross-ton basic open-hearth steel furnaces, with an annual capacity of 420,000 tons of ingots, and 10 trains of rolls (two 10, one 14, one 8, and one 9-inch bar, and two 8, one 9, one 10, and one 14-inch hoop); estimated annual capacity, 240,000 tons of flat bars and hoops; these additions will probably be completed in the fall of 1908.

Painter Mill, South Side, Pittsburgh. Built in 1834; 9 regenerative gas heating furnaces and 8 trains of rolls (five 8, one 9, one 10, and one compound 16-inch); product, principally oil, whisky, and trunk hoops; also hoops for pails, tubs, and wooden ware; also cotton-ties, lock steel, stone saws, merchant bands, skelp, and hinge steel; annual capacity, 115,000 tons. Fuel, natural gas, producer gas, and coal. Brand, for export only, "Carnegie. U. S. A."

Sharon Steel Works, Sharon, Pa. Built in 1896-7 and first put in operation in May, 1897; six 35-gross-ton basic open-hearth steel furnaces; first steel made May 24, 1897; annual capacity, 125,000 tons of ingots; four 4-hole soaking pits, one 35-inch blooming mill, and one 3-high 27-inch finishing mill having connected with it a 22-inch bending and a 24-inch bullhead mill; product, blooms, skelp, and angles; annual capacity, 220,000 tons of blooms and 110,000 tons of angles or skelp. Fuel, coal and producer gas.

South Sharon Steel Works, South Sharon, Pa. Built in 1900-1; twelve 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 480,000 tons of ingots; first steel made April 30, 1901; one 250-ton metal mixer, three 4-hole soaking pits, one 36-inch blooming mill, and one 48-inch universal mill; product, blooms, billets, skelp, and universal plates; also forging blooms and forging billets; annual capacity, 300,000 tons of blooms and billets and 120,000 tons of universal plates and skelp. Fuel, producer gas. Molten metal is taken from the South Sharon Furnaces to the metal mixer and thence conveyed to the open-hearth furnaces in ladles. (Formerly called the South Sharon Works; owned by the Union Steel Company.)—See page 72.

Upper Union Mill, Youngstown, Ohio. Built in 1871 and burned and rebuilt in 1877; 5 gas heating furnaces and 7 finishing mills (one 7 and one 8-inch continuous, two 10-inch continuous hoop, one 12-inch merchant, one 8-inch guide, and one 10-inch bar); product, merchant bars, hoop, band, and tire steel, angles, special shapes, skelp, channels, and cotton-ties; annual capacity, 160,000 tons. Fuel, coal and manufactured gas.

Upper Union Mills, Thirty-third street, Pittsburgh, on the Allegheny Valley Railway. Built in 1863-4 by the Cyclops Iron Company; enlarged by Carnegie, Kloman & Co., Carnegie Brothers & Co., Limited, and Carnegie, Phipps & Co., Limited; 21 heating furnaces and 7 trains of rolls (one 8, one 12, one 18, and one 20-inch, two plate, and one 17-inch); product, structural steel, steel bars, and steel universal plates; annual capacity, 180,000 tons of structural steel, 25,000 tons of steel bars, 105,000 tons of universal plates, and 15,000 tons of fitted structural work. Fuel, natural gas and coal.

Total annual capacity of the 22 rolling mills and steel works: 4,550,000 gross tons of Bessemer steel ingots, 4,140,000 tons of open-hearth steel ingots, 6,714,000 tons of blooms, billets, slabs, and sheet and tinplate bars, including forging blooms and forging billets, 1,355,000 tons of standard sections of steel rails, 105,000 tons of light sections of steel rails, 965,000 tons of beams, channels, angles, and other structural shapes, 45,000 tons of fitted structural work, 1,130,000 tons of universal, sheared, and boiler, ship, tank, and other plates, 83,200 tons of skelp, 165,000 tons of axles, 57,000 tons of splice bars, 535,000 tons of merchant bars, 455,800 tons of hoop, band, box, and scroll steel and cotton-ties, 35,000 tons of railroad ties, 10,000 tons of slack barrel hoops, 15,000 tons of twisted bars for concrete work, 10,000 tons of finished armor plates, 154,900 tons of iron, brass, and steel castings and ingot moulds and stools, and 39,400 tons of other forms of rolled and forged iron and steel products.

CAR AND LOCOMOTIVE AXLE WORKS.

Howard Axle Works, Homestead, Pennsylvania. Product, car and locomotive axles; annual capacity, 165,000 gross tons.

BOLT, RIVET, AND SLACK BARREL HOOP WORKS.

Homestead Steel Works, Munhall, Pa. Product, round, square, and hexagon bolts and buttons and cone-headed rivets. Sizes: bolts, from $\frac{3}{8}$ of an inch to 3 inches; rivets, from $\frac{3}{8}$ of an inch to 1 inch. McCutcheon Slack Barrel Hoop Factory, Allegheny, Pa. Product, slack barrel hoops; annual capacity, 10,000 tons.

Upper Union Mills, Pittsburgh. Product, steel bolts and rivets. Sizes: bolts, from $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inches in diameter and from $1\frac{1}{2}$ inches to 24 inches long; rivets, from $\frac{3}{8}$ of an inch to 1 inch in diameter and from $1\frac{1}{2}$ inches to 6 inches long.

FOUNDRIES.

Bellaire Steel Works, Bellaire, Ohio. Product, iron, brass, and steel castings for the use of the company; annual capacity, 1,600 tons. Edgar Thomson Steel Works, Bessemer, Pa. Product, iron and brass castings for the company's use; annual capacity, 14,000 tons of castings and 136,000 tons of ingot moulds and stools. Homestead Steel Works, Munhall, Pa. Product, open-hearth steel castings for the use of the company; annual capacity, 3,300 tons. Total annual capacity: 18,900 gross tons of iron, brass, and steel castings and 136,000 gross tons of ingot moulds and stools.

CARNEGIE STEEL COMPANY (OF PENNSYLVANIA).

The Carnegie Steel Company (of Pennsylvania) ceased to be an operating company on March 31, 1903, when its plants were leased to the Carnegie Steel Company (of New Jersey). The latter company has since operated all the plants of the former company.

PROPERTY AT CONNEAUT, OHIO.

The Carnegie Steel Company owns about 5,000 acres of land on Lake Erie, at Conneaut, Ohio, which is suitable for mill sites.

BESSEMER AND LAKE ERIE RAILROAD COMPANY.

Bessemer and Lake Erie Railroad Company, lessee of the road and property of the Pittsburgh, Bessemer, and Lake Erie Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers at Pittsburgh*: James H. Reed, President; E. H. Utley, Vice President and General Manager; G. W. Kepler, Secretary and Treasurer; William J. Post, Auditor; and W. A. Parker, Purchasing Agent. *Officers at Greenville, Pa.*: H. T. Porter, Chief Engineer, and J. S. Matson, Superintendent. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey). This company owns 8.87 miles of main line and 2.04 miles of sidings and operates under lease 237.21 miles of main line and branches and 208.25 miles of second track and sidings between Conneaut Harbor, Ohio, Erie, Pa., and North Bessemer, Pa. It has 107 standard-gauge locomotives and 58 passenger, 8,654 freight, and 93 service cars.

CARNEGIE NATURAL GAS COMPANY.

Carnegie Natural Gas Company; general offices, Carnegie Building, Pittsburgh. *Officers*: Daniel M. Clemson, President; Norwood Johnston, Vice President; W. W. Blackburn, Secretary; James J. Campbell, Assistant Secretary; H. E. Jeffries, Treasurer; and H. L. Smith, Auditor. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Carnegie Natural Gas Company owns or has under lease 148-151 acres of gas territory in Allegheny, Washington, Armstrong, and Westmoreland counties, Pa., and in Wetzel and Doddridge counties, W. Va. The property includes 215 producing gas wells and 400 miles of main and branch pipe lines, supplying about 22,500,000,000 cubic feet of natural gas per annum.

PITTSBURGH STEAMSHIP COMPANY.

Five-sixths of the stock of the Pittsburgh Steamship Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see pages 90-91.

OLIVER IRON MINING COMPANY.

All the capital stock of the Oliver Iron Mining Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see pages 84-89.

H. C. FRICK COKE COMPANY.

Over 74 per cent. of the stock of the H. C. Frick Coke Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see pages 79-84.

PITTSBURGH AND CONNEAUT DOCK COMPANY.

Pittsburgh and Conneaut Dock Company; general offices, Carnegie Building, Pittsburgh. *Officers*: J. H. Reed, President; D. G. Kerr, Vice President; William J. Post, Secretary and Auditor; and G. W. Kepler, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company operates the docks at the lake terminus of the Bessemer and Lake Erie Railroad Company, at Conneaut Harbor, Ohio. The docks have a daily capacity of 40,000 tons of iron ore and 4,000 tons of coal.

UNION RAILROAD COMPANY.

Union Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers:* James H. Reed, President; D. M. Clemson, Vice President; G. E. Campbell, General Freight Agent; William J. Post, Secretary and Auditor; and G. W. Kepler, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Union Railroad Company owns 14.88 miles of main line and branches and 53.78 miles of second track and sidings and operates under lease 8.10 miles of main line and branches and 19.72 miles of second track and sidings. It is equipped with 89 locomotives, 1,200 steel freight cars, and 33 service cars.

THE PITTSBURGH LIMESTONE COMPANY, LIMITED.

The Pittsburgh Limestone Company, Limited; general offices, New Castle, Pa. *Officers:* George W. Johnson, Chairman; William B. Schiller, Treasurer; and D. G. Kerr, Secretary. Seventy-five per cent. of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company operates limestone quarries at Tyrone and Williamsburg, in Blair county, and at Wick, in Butler county, Pennsylvania. The daily capacity of its quarries is about 4,500 tons.

THE YOUGHIOGHENY NORTHERN RAILWAY COMPANY.

All the capital stock of the Youghioghenny Northern Railway Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 81.

TROTTER WATER COMPANY.

Over 53 per cent. of the capital stock of the Trotter Water Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 81.

NATIONAL MINING COMPANY.

Two-thirds of the capital stock of the National Mining Company is owned by the Carnegie Steel Company (of New Jersey) and one-third by the American Sheet and Tin Plate Company. For further information concerning the National Mining Company see page 82.

MOUNT PLEASANT WATER COMPANY.

All the capital stock of the Mount Pleasant Water Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 82.

CHAPIN MINING COMPANY.

All the capital stock of the Chapin Mining Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 85.

WINTHROP IRON COMPANY.

All the capital stock of the Winthrop Iron Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see pages 85-86.

MINGO COAL COMPANY.

All the capital stock of the Mingo Coal Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 83.

THE N. Y., P., AND O. DOCK COMPANY.

The N. Y., P., and O. Dock Company; general offices, Cleveland. *Officers:* H. G. Dalton, President and Treasurer; Harvey H. Brown, Vice President; James H. Hoyt, Secretary; and Pickands, Mather & Co., Managers and Agents. Twenty-five per cent. of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The N. Y., P., and O. Dock Company operates the docks at the lake terminus of the Erie Railroad at Cleveland, Ohio, which have a daily capacity of 20,000 tons of iron ore.

UNION SUPPLY COMPANY.

Union Supply Company; general offices, Carnegie Building, Pittsburgh. *Officers:* J. W. Anawalt, President; John Lynch, Vice President and General Superintendent; and William McWilliams, Secretary and Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey). This company operates stores and transacts a general merchandise business.

PENNSYLVANIA AND LAKE ERIE DOCK COMPANY.

Pennsylvania and Lake Erie Dock Company; general offices, Carnegie Building, Pittsburgh. *Officers at Pittsburgh:* D. G. Kerr, President; A. S. Chisholm, Vice President; MacGilvray Shiras, Treasurer; and W. W. Blackburn, Secretary. *Officer at Conneaut Harbor, Ohio:* R. R. Richardson, General Manager. Fifty-two per cent. of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company operates docks at the lake terminus of the Baltimore and Ohio Railroad, at Fairport Harbor, Ohio, which have a daily capacity of about 20,000 tons of iron ore.

THE COLUMBUS STONE COMPANY.

The Columbus Stone Company; general offices, Carnegie Building, Pittsburgh. *Officers at Pittsburgh:* D. G. Kerr, President; W. W. Blackburn, Secretary; W. C. McCausland, Treasurer; and James J. Campbell, Auditor and Assistant Secretary. *Officer at Columbus, Ohio:* W. J. Root, Vice President and General Manager. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company owns and operates limestone quarries near Columbus, Ohio.

MAHONING LIMESTONE COMPANY.

Mahoning Limestone Company; general offices, Carnegie Building, Pittsburgh. *Officers at Pittsburgh:* D. G. Kerr, President; G. W. Johnson, Vice President; W. W. Blackburn, Secretary; W. C. McCausland, Treasurer; and James J. Campbell, Auditor and Assistant Secretary. *Officer at New Castle:* Charles Johnson, General Manager. Fifty-one per cent. of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Mahoning Limestone Company owns and operates limestone quarries in Pennsylvania near Lowellville, Ohio.

ISABELLA LIMESTONE COMPANY.

Isabella Limestone Company; general offices, New Castle, Pa. *Officers at New Castle:* G. W. Johnson, President and General Manager, and T. H. Hartman, Acting Auditor. *Officers at Pittsburgh:* D. G. Kerr, Secretary, and W. W. Blackburn, Treasurer. Two-thirds of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company owns and operates limestone quarries at Stover, Pa.

PEOPLES SUPPLY COMPANY, LIMITED.

Peoples Supply Company, Limited; general offices, New Castle, Pa. *Officers at New Castle:* George W. Johnson, Chairman and General Manager, and T. H. Hartman, Acting Auditor. *Officer at Pittsburgh:* D. G. Kerr, Secretary and Treasurer. Seventy-five per cent. of the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Peoples Supply Company, Limited, operates a number of stores in the western part of Pennsylvania in connection with the limestone interests of the Carnegie Steel Company (of New Jersey).

CARNEGIE LAND COMPANY.

Carnegie Land Company; general offices, Carnegie Building, Pittsburgh. *Officers:* D. M. Clemson, President; L. H. Burnett, Vice President; W. C. McCausland, Treasurer; W. W. Blackburn, Secretary; and James J. Campbell, Assistant Secretary. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company owns lands and houses in Allegheny, Washington, Westmoreland, Fayette, and Erie counties, Pennsylvania.

THE CONNEAUT LAND COMPANY.

The Conneaut Land Company; general offices, Carnegie Building, Pittsburgh. *Officers:* D. M. Clemson, President; L. H. Burnett, Vice President; W. C. McCausland, Treasurer; W. W. Blackburn, Secretary; and James J. Campbell, Assistant Secretary. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Conneaut Land Company owns lands in Ashtabula county, Ohio.

ETNA AND MONTROSE RAILROAD COMPANY.

Etna and Montrose Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers:* J. H. Reed, President; D. M. Clemson, Vice President; William J. Post, Secretary and Auditor; and G. E. Campbell, General Freight Agent. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The Etna and Montrose Railroad Company owns and operates 2.52 miles of main line and branches between Etna and Pine Creek, Pennsylvania.

WAREHOUSES AND SHOPS AT WAVERLY, N. J.

The Carnegie Steel Company (of New Jersey) is erecting at Waverly, New Jersey, about 3 miles from Newark station, on the Pennsylvania Railroad, warehouses and shops for the purpose of promptly meeting the requirements of the Eastern territory, especially in and about New York City. The main warehouse will store under cover from 40,000 tons to 50,000 tons of structural material, while the smaller warehouse will store from 25,000 tons to 30,000 tons of bars and small shapes, sheets, tinplates, nails, and other goods manufactured by the subsidiary companies of the United States Steel Corporation. Connected with the main warehouse will be necessary shops equipped for punching and riveting structural angles, beams, and channels.

FEDERAL STEEL COMPANY.

Practically all the stock of the Federal Steel Company is now owned by the United States Steel Corporation.

Federal Steel Company; general offices, Empire Building, New York. *Officers:* Elbert H. Gary, President; Richard Trimble, Secretary and Treasurer; and W. J. Filbert, Auditor.

Capital stock issued, \$99,745,200, of which \$53,260,900 is 6 per cent. non-cumulative preferred and \$46,484,300 is common. The Federal Steel Company owns the entire capital stock of the Illinois Steel Company, the Indiana Steel Company, the National Tube Company (of Ohio), the Lorain Steel Company, the Minnesota Iron Company, the Elgin, Joliet, and Eastern Railway Company, and the Connellsville and Monongahela Railway Company.

THE ILLINOIS STEEL COMPANY.

The Illinois Steel Company; general offices, Commercial National Bank Building, Chicago. *Officers:* E. J. Buffington, President; T. W. Robinson, First Vice President; G. G. Thorp, Second Vice President; T. J. Hyman, Secretary and Treasurer; L. D. Doty, Purchasing Agent; and George Baker, General Manager of Sales. *Sales Department Offices:* Commercial National Bank Building, Chicago; Telephone Building, Boston; Empire Building, New York; Pennsylvania Building, Philadelphia; Ellicott Square Building, Buffalo; Rockefeller Building, Cleveland; Carnegie

Building, Pittsburgh; Union Trust Building, Cincinnati; Candler Building, Atlanta, Ga.; Hennen Building, New Orleans; Union Trust Building, Detroit; Pioneer Press Building, St. Paul; Chemical Building, St. Louis; Equitable Building, Denver; Crocker Building, San Francisco; and Ainsworth Block, Portland, Oregon. Capital stock, \$18,650,600, all common. The Illinois Steel Company operates the following blast furnaces, rolling mills, etc.:

BLAST FURNACES—21.

Joliet Works, Joliet, Illinois. Four stacks: Nos. 1 and 2, each $78\frac{1}{2} \times 19\frac{1}{2}$; No. 3, 80×20 ; and No. 4, 90×22 . Nos. 1 and 2 built in 1873; No. 1 first blown in June 9, 1880, and No. 2 February 8, 1882; rebuilt in 1891; No. 3 built in 1903 and first blown in in January, 1904; and No. 4 built in 1906 and first blown in September 2, 1906; four Siemens-Cowper, four Massicks & Crooke, four Whitwell-Gordon, and four 4-pass stoves; fuel, Connellsville and Pocahontas Flat-Top coke; ores, Lake Superior and Northern ranges; product, Bessemer pig iron; total annual capacity, 550,000 tons. The furnaces are equipped with 2 Heyl & Patterson pig-iron casting machines. (One stack, known as old No. 3, $78\frac{1}{2} \times 19\frac{1}{2}$, built in 1889-90, dismantled in 1905.)—*All active in 1907.*

Milwaukee Works, Bay View Furnaces, Milwaukee, Wisconsin. Two stacks, Nos. 1 and 2, each 66×16 , built in 1870-1; No. 1 first blown in in April, 1870, and No. 2 in April, 1871; six Massicks & Crooke stoves; fuel, coke; ores, Lake Superior, Gogebic, and Iron Ridge; product, basic, malleable Bessemer, forge, and foundry pig iron; total annual capacity, 135,000 tons. Brands, "Bay View, Nos. 1, 2, and 3," "Gertrude," and "Milwaukee Scotch."—*Both active in 1907.*

North Works, Chicago. Furnaces on the west bank of the North Branch of the Chicago river, north of North ave. Two stacks, Nos. 1 and 2, each 66×16 , built in 1869-70; No. 1 first blown in in March, 1870, and No. 2 in June, 1870; six stoves; fuel, Connellsville and Pocahontas coke; ores, Lake Superior, Lake Michigan, Western, and foreign; product, chiefly spiegeleisen and Bessemer pig iron; total annual capacity, 100,000 tons.—*Both active in 1907.*

South Works, South Chicago. Eleven stacks: Nos. 1, 2, 3, and 4 built in 1880-1; No. 4 remodeled in 1901 and Nos. 1, 2, and 3 in 1903; No. 1 rebuilt in 1906-7; Nos. 1 and 2 are 75×20 , No. 3 is 75×19 , and No. 4 is 90×21 ; Nos. 1 and 2 blown in in June, 1881, and Nos. 3 and 4 in 1882; sixteen Siemens-Cowper-Foote stoves. Nos. 5, 6, 7, and 8 built in 1890-1; Nos. 5, 6, and 8 remodeled

in 1902 and No. 7 remodeled in 1903; Nos. 5, 7, and 8 are each $88\frac{1}{2} \times 21$ and No. 6 is $88\frac{1}{2} \times 20$; Nos. 5 and 6 were blown in in May, 1891, No. 7 in July, 1891, and No. 8 in January, 1892; sixteen Massicks & Crooke stoves. Nos. 9 and 10, each 95×22 , built in 1900-1; No. 9 blown in July 3 and No. 10 December 13, 1901; eight 4-pass hot-blast stoves. Furnace E, 90×22 , built in 1905-6 and first blown in June 21, 1906; four 4-pass stoves. Fuel, Connellsville and Pocahontas coke; ores, Lake Superior and Northern ranges; product, Bessemer and basic pig iron; total annual capacity, 1,650,000 tons. The furnaces are equipped with 6 Heyl & Patterson pig-iron casting machines.—*All active in 1907.*

Union Works, Chicago. Furnaces at Ashland avenue and Thirty-first st., on the South Branch of the Chicago river. Two stacks, Nos. 3 and 4, each $73 \times 15\frac{1}{2}$, built in 1881 and rebuilt in 1889; No. 3 first blown in May 2, 1881, and No. 4 in May, 1882; seven Siemens-Cowper-Foote stoves; fuel, Connellsville and Pocahontas Flat-Top coke; ores, Lake Superior, Gogebic, and Minnesota for Bessemer pig iron and foreign, Southern, and Western for spiegeleisen and ferromanganese; product, spiegeleisen, ferromanganese, and Bessemer pig iron; total annual capacity, 120,000 tons.—*Both active in 1907.*

Total annual capacity of the 21 furnaces: 2,555,000 gross tons of Bessemer, basic, malleable Bessemer, foundry, forge, and other grades of pig iron, spiegeleisen, ferromanganese, etc.

ROLLING MILLS AND STEEL WORKS—3.

Joliet Works, Joliet, Illinois. Built in 1870; one 12-gross-ton and two 10-gross-ton Bessemer steel converters; first blow made January 26, 1873, and first steel rail rolled March 15, 1873; annual capacity, 660,000 gross tons of Bessemer steel ingots. Steel billet mill has 7 heating furnaces, one 36-inch blooming train, and one 23-inch rail train; annual capacity, 480,000 gross tons of short billets and 120,000 gross tons of long billets. Wire-rod mill contains one Garrett mill built in 1888 and another added in 1895 and 4 heating furnaces; annual capacity, 230,000 tons. A third wire-rod mill, arranged to roll either rods, hoops, or cotton-ties, added in 1898; annual capacity, 50,000 tons of wire rods or 30,000 tons of cotton-ties and hoops. (This mill is now used for rolling spike rods; annual capacity, 84,000 tons.) Merchant mill, built in 1895, contains machinery for the production of merchant steel and railroad supplies, including tie plates, base plates, angle bars, spikes, bolts, nuts, washers, etc.; annual capacity of the merchant mill, 30,000 tons of tie plates, 6,000 tons of base plates,

and 24,000 tons of factory stock ; also 84,000 tons of angle bars and other joints, 70,000 tons of standard spikes, and 20,000 tons of bolts and nuts. Also make iron, brass, and steel castings ; annual capacity, 13,000 tons. Fuel, coal for steam, manufactured gas in the principal departments, and some fuel oil for heating purposes. Total annual capacity, 660,000 tons of Bessemer steel ingots, 600,000 tons of long and short billets, 230,000 tons of wire rods, 84,000 tons of spike rods, 60,000 tons of merchant products, 84,000 tons of angle bars and other joints, 90,000 tons of standard spikes, bolts, and nuts, and 13,000 tons of castings, the latter for the use of the company exclusively.

Milwaukee Works, Milwaukee. Built in 1868 and 1874 ; remodelled in 1895-6 ; 9 continuous heating furnaces, using gas for fuel, and 6 trains of rolls (one 8, two 9, one 12, one 21, and one 22-inch) ; product, light rails, (12 to 45 pounds per yard,) merchant bar steel, and angle and splice bars ; annual capacity, 60,000 tons of light rails, 271,000 tons of merchant bars, 1,800 tons of angle bars and other joints, 1,270 tons of factory stock, and 1,180 tons of small spikes. Fuel used, coal and manufactured gas.

South Works, South Chicago. Bessemer steel department, built in 1881-2 ; three 15-gross-ton Bessemer steel converters and twenty-four 8-ingot soaking pits ; first blow made June 14, 1882 ; product, ingots ; annual capacity, 1,020,000 tons ; two 300-ton metal mixers are being added. Rail mill No. 1, built in 1881-2 ; one 3-high 40-inch blooming and one 3-high 27-inch finishing rail train with 4 stands ; first steel rail rolled in June, 1882 ; product, rails ; annual capacity, 780,000 tons. Two open-hearth departments : Open-hearth department No. 1, built in 1894-5 ; first acid and basic steel made in February, 1895 ; four 50-gross-ton and six 30-gross-ton stationary basic furnaces ; annual capacity, 240,000 tons of ingots. Open-hearth department No. 2, built in 1904-6 ; first basic steel made in December, 1904 ; fourteen 50-gross-ton basic stationary furnaces and one 250-ton mixer, the latter added in 1906 ; this department never made acid steel ; annual capacity, 550,000 tons of ingots. Plate mill added in 1894-5 ; first put in operation February 12, 1895 ; 2 stands of rolls (one 34 x 90-inch and one 36 x 132-inch) and 4 gas heating furnaces ; product, fire-box, and boiler, ship, and tank plate ; annual capacity, 135,000 tons. Slabbing mill added in 1898-9 ; first put in operation March 16, 1899 ; one 40-inch mill ; product, billets, blooms, and slabs ; annual capacity, 285,000 tons. Blooming mill added in 1904-5 ; first put in operation February 1, 1905 ; one 40-inch reversing mill with six 4-hole 4-ingot soaking pits ; product, billets, blooms, and

unfinished structural shapes; annual capacity, 360,000 tons. Structural mill added in 1905; first put in operation November 1, 1905; one 32-inch reversing roughing mill with one stand of 2-high rolls, one 28-inch mill with one stand of 2-high rolls and 2 stands of 3-high rolls, and 3 heating furnaces; product, angles from 4 x 4 inches to 8 x 8 inches and beams and channels from 6 inches to 15 inches; annual capacity, 168,000 tons of finished structural shapes. Rail mill No. 2 added in 1906-7; first put in operation in August, 1907; one 23-inch mill with 3 stands of 3-high rolls and 2 continuous heating furnaces; product, light rails; annual capacity, 80,000 tons. One 30-inch universal mill with 2 continuous heating furnaces added in 1906-7; first put in operation July 25, 1907; product, universal plates 6 inches to 30 inches wide; annual capacity, 75,000 tons. One 2-high 35-inch reversing blooming mill, formerly in the dismantled Breaker Island Works of the American Steel and Wire Company, at Breaker Island, N. Y., added in 1906-7 and first put in operation May 1, 1907; product, billets and blooms; annual capacity, 150,000 tons. Foundries: Iron, brass, and steel foundries are connected with these works; the steel foundry is equipped with one 30-gross-ton acid open-hearth steel furnace with an annual capacity of 20,000 tons; first open-hearth steel castings made in June, 1904. Fuel, coal for steam and manufactured gas for heating and open-hearth furnaces. Total annual capacity, 1,020,000 tons of Bessemer ingots, 790,000 tons of open-hearth ingots, 285,000 tons of slabs, 210,000 tons of blooms, 300,000 tons of short billets, 168,000 tons of finished structural shapes, 80,000 tons of light rails, 780,000 tons of heavy rails, 135,000 tons of fire-box, and boiler, ship, and tank plate, 75,000 tons of universal plates, and 44,000 tons of open-hearth and Bessemer steel and iron and brass castings for the use of the company exclusively.

Total annual capacity of the 3 rolling mills and steel works: 1,680,000 gross tons of Bessemer steel ingots, 790,000 tons of open-hearth steel ingots, 285,000 tons of slabs, 210,000 tons of blooms, 780,000 tons of short billets, 120,000 tons of long billets, 168,000 tons of structural shapes, 780,000 tons of standard sizes of steel rails, 140,000 tons of light rails, 271,000 tons of steel merchant bars, 84,000 tons of spike rods, 135,000 tons of fire-box, and boiler, ship, and tank plate, 75,000 tons of universal plates, 30,000 tons of tie plates, 6,000 tons of base plates, 230,000 tons of wire rods, 25,270 tons of factory stock, 20,000 tons of bolts and nuts, 85,800 tons of angle bars and other joints, and 71,180 tons of spikes. Also 20,000 tons of open-hearth and 37,000 tons of Bessemer steel and iron and brass castings for the use of the company. The

company also operates an iron and steel bridge and structural plant at North Chicago, with an annual capacity of 20,000 tons.

WIRE-ROD AND BRIDGE AND STRUCTURAL PLANTS.

Joliet Works, Joliet. Product, wire rods; annual capacity, 230,000 tons.

North Works, North Chicago. Product, railroad and highway bridges; also iron and steel buildings; annual capacity, 20,000 tons.

BOLT, NUT, AND SPIKE WORKS.

Joliet Works, Joliet. Product, steel bolts, nuts, and standard steel spikes. Sizes: bolts and nuts, from $\frac{1}{2}$ of an inch to 1 inch; spikes, from $4 \times \frac{1}{2}$ to $5\frac{1}{2} \times \frac{3}{4}$ of an inch; annual capacity, 20,000 tons of bolts and nuts and 70,000 tons of spikes.

Milwaukee Works, Milwaukee, Wisconsin. Product, small spikes; annual capacity, 1,180 tons. Do not make bolts or nuts.

STEEL SUPPLY PLANT AND STORAGE WAREHOUSES.

At its North Works the company has a plant for cutting to size and distributing steel from warehouses. This plant has an annual capacity of 70,000 tons. The company also has storage warehouses at its North Works which have a capacity of 30,000 tons.

IRON, BRASS, AND STEEL FOUNDRIES.

Joliet Works, Joliet. Product, iron, brass, and Bessemer steel castings for the company's use; annual capacity, 13,000 tons.

South Works, South Chicago. Product, iron, brass, and open-hearth steel machinery castings for the company's use; annual capacity, 24,000 tons of iron and brass castings and 20,000 tons of open-hearth steel castings.

Total annual capacity of the iron, brass, and steel foundries: 57,000 gross tons of castings, all for the use of the company.

RAILROADS, ORE MINES, COAL LANDS, AND COKE OVENS.

The Illinois Steel Company owns the entire capital stock of the Chicago, Lake Shore, and Eastern Railroad Company, which operates 526 miles of track by ownership, lease, or otherwise. It also owns all the capital stock of the Cundy Iron Company, which operates the Cundy mine, at Quinnesec, Michigan. In addition it owns the Iron Ridge mine, at Iron Ridge, Dodge county, Wisconsin, and 3,938 acres of iron-ore lands in Marquette, Dickinson, Iron, and Baraga counties, Michigan, on which is located the Youngstown mine, near Crystal Falls; also 2,920 acres of mineral lands in Iron and Gogebic counties, Michigan. It also owns 2,640 acres of coal lands in Williamson county, Illinois, 185 acres

of limestone lands in Vermilion county, Illinois, and all the capital stock of the United States Coal and Coke Company, which leases 50,000 acres of coal lands in McDowell county, W. Va. For further information concerning the United States Coal and Coke Company and the Cundy Iron Company see pages 83 and 87.

INDIANA STEEL COMPANY.

Indiana Steel Company; general offices, Commercial National Bank Building, Chicago. *Officers:* E. J. Buffington, President; G. G. Thorp, Vice President; T. J. Hyman, Secretary and Treasurer; L. W. McNamee, Auditor; and L. D. Doty, Purchasing Agent. The Indiana Steel Company is building the following plants:

BLAST FURNACES—4 BUILDING AND 12 PROJECTED.

Gary Furnaces, Gary, Indiana. Four building and twelve projected stacks: building stacks, to be known as Nos. 9, 10, 11, and 12, each to be 88 x 21½; construction commenced July 15, 1906; to be equipped with sixteen Massicks & Crooke stoves, each 100 x 22; fuel to be used, coke; ore, chiefly Lake Superior; product, basic pig iron; estimated annual capacity, 600,000 tons. Molten metal from these furnaces will be used in the open-hearth furnaces of the company. Twelve additional furnaces are projected; work upon furnaces Nos. 5, 6, 7, and 8, each to be 88 x 21½, will probably be commenced in the summer of 1907; these furnaces will be equipped with sixteen stoves, each 100 x 22, and will have a total annual capacity of 600,000 tons.—*Nos. 11 and 12 will probably be ready for blast in July, 1908, and Nos. 9 and 10 in January, 1909.*

Total annual capacity of the 4 building furnaces: 600,000 tons.

BUILDING AND PROJECTED STEEL PLANT.

Open-Hearth Steel Department, Gary. Construction commenced in August, 1906; twenty-eight 60-gross-ton Siemens stationary basic open-hearth steel furnaces and two 300-ton metal mixers; product, ingots; estimated annual capacity, 1,000,000 tons. Fuel, producer gas. Molten pig iron will be taken from the Gary Furnaces to the mixers and thence to the open-hearth furnaces in ladles. Twenty-eight additional 60-gross-ton Siemens stationary basic open-hearth furnaces are projected; work upon these furnaces will probably be commenced during the summer of 1907.—*The building open-hearth furnaces will probably be completed from August to December, 1908.*

Total estimated annual capacity of the building steel plant: 1,000,000 gross tons of open-hearth steel ingots.

BUILDING AND PROJECTED ROLLING MILLS.

Rolling Mill Department, Gary. This department is being equipped with a blooming mill and a rail mill; the rail mill will have an annual capacity of about 750,000 tons. Billet, structural, 48-inch universal plate, 160-inch sheared plate, and merchant mills are to be added.—*Work on the blooming and rail mills was commenced on February 20, 1907; work on the universal plate mill (annual capacity, 195,000 tons) will be commenced in the summer of 1907.*

GARY LAND COMPANY.

Gary Land Company; general offices, Commercial National Bank Building, Chicago. *Officers:* E. J. Buffington, President; G. G. Thorp, Vice President; T. J. Hyman, Secretary and Treasurer; and L. W. McNamee, Auditor. This company owns large acreages of land in Lake county, Indiana, on which the city of Gary is now being built.

THE NATIONAL TUBE COMPANY (OF OHIO).

The National Tube Company (of Ohio); general offices, Lorain, Ohio. *Officers:* William B. Schiller, President; Edward Worcester, First Vice President; John D. Culbertson, Second Vice President, Treasurer, and Secretary; Taylor Allderdice, Third Vice President; J. W. Downer, General Manager of Sales; B. C. Moise, Assistant Treasurer and Assistant Secretary; S. M. Lynch, Purchasing Agent; and Max M. Suppes, Manager. Capital stock, \$9,000,000, of which \$3,000,000 is 8 per cent. cumulative preferred and \$6,000,000 is common. The National Tube Company (of Ohio) operates the following works:

BLAST FURNACES—4 COMPLETED AND 1 BUILDING.

Lorain Works, Lorain, Ohio. Completed blast furnaces: 4 stacks: Furnaces A and B, each 100 x 22, and C and D, each 85 x 22; Furnace A, built in 1898-9 and blown in July 5, 1899; Furnace B, built in 1898-9 and blown in August 23, 1899; Furnace C, built in 1903-4 and blown in September 10, 1904; and Furnace D, built in 1903-5 and blown in February 22, 1905; sixteen Cowper fire-brick stoves, each 100 x 21; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 650,000 tons. Equipped with 2 pig-iron casting machines. Furnace B is to be rebuilt and size changed to 90 x 22. Molten metal from these furnaces is used in the Bessemer converters at the Lorain Works. (Formerly called Lorain Furnaces Nos. 1, 2, 3, and 4).—*All active in 1907.*

Building stack: Furnace E, to be 90 x 22; construction commenced in January, 1907; being equipped with four Massicks & Crooke hot-blast stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; estimated annual capacity, 150,000 tons.—*Will probably be ready for operation in September, 1907.*

Total annual capacity of the 4 completed furnaces: 650,000 gross tons; of the building furnace, 150,000 tons: total, 800,000 tons.

ROLLING MILLS AND STEEL WORKS—I.

Lorain Works, Lorain, Ohio. Built in 1894-5 and enlarged in 1904-5. Steel works contain two 12-gross-ton acid Bessemer converters, two 200-ton metal mixers, 28 soaking pits, and two 38-inch reversible blooming mills; first blow made April 1, 1895. Rail mill built in 1894-5, using rail-mill machinery from Johnstown, Pa.; one 27-inch girder rail mill, with an engine at each end, making practically a double mill, and 4 gas heating furnaces; first steel rail rolled in April, 1895. Skelp mill, built in 1903-5, contains one 34 x 90-inch plate mill, one 30 x 48-inch universal mill, one 28-inch reversing mill, one 14-inch continuous mill, and 10 Siemens and 2 continuous heating furnaces; first skelp rolled February 10, 1905. Product, Bessemer steel ingots, billets, rails, and skelp; annual capacity, 720,000 tons of ingots, 630,000 tons of billets, 220,000 tons of rails, and 360,000 tons of skelp. Fuel, producer gas and coal. Molten metal from the blast furnaces at Lorain is used in the Bessemer steel converters.

WROUGHT PIPE MILL, GALVANIZING PLANT, AND FOUNDRIES.

Lorain Works, Lorain, Ohio. Pipe Mill: Product, wrought pipe; sizes, from $\frac{1}{2}$ of an inch to 20 inches inclusive; annual capacity, 300,000 tons. A galvanizing plant is being added to these works.

Lorain Works, Lorain, Ohio. Foundry: Product, gray iron rolls, general loam castings, ingot moulds, and brass castings; annual capacity, 12,000 gross tons of ingot moulds, 9,000 gross tons of gray iron castings, and 300 gross tons of brass castings.

THE LORAIN STEEL COMPANY.

The Lorain Steel Company; general offices, Pennsylvania Building, Fifteenth and Chestnut sts., Philadelphia. *Officers at Philadelphia:* Daniel Coolidge, President, and P. M. Boyd, Secretary and Treasurer. *Officers at Johnstown:* P. Lavelle, Vice President and General Manager, and H. M. Davies, Auditor.

Sales Agencies: 74 Broadway, New York; Pennsylvania Building, Philadelphia; Monadnock Building, Chicago; Chemical Build-

ing, St. Louis ; Frick Building Annex, Pittsburgh ; Equitable Building, Atlanta ; Rockefeller Building, Cleveland ; and Crocker Building, San Francisco.

Capital stock, \$3,000,000, all common. The Lorain Steel Company operates the foundries and other plants described below:

FOUNDRIES, SWITCHES, CROSSINGS, AND SPECIAL WORK.

Johnstown Works, Johnstown, Pa. Original works built in 1887-8 and put in operation May 13, 1888 ; open-hearth steel department started in 1889 ; 3 acid furnaces (one 10 and two 15-gross-ton) and 3 regenerative annealing furnaces ; product, steel castings ; annual capacity, 15,000 tons ; fuel, coal and oil. A gray iron foundry is connected with the works ; product, castings and rolls for commercial purposes and special track work ; annual capacity, 4,680 tons. Also a plant for the manufacture of switches, mates, curve crosses, frogs, split switches, girder crossings, drop forgings, curves, track and machine bolts, and all kinds of special work for steam and street railways ; annual capacity, 24,600 tons. Also an electric-welding plant, equipped with portable welding machines for electrically welding joints in street railway tracks. The steel-casting department was enlarged in 1907 ; the other departments are to be enlarged and their capacity practically doubled. Total annual capacity : 15,000 tons of open-hearth steel castings, 4,680 tons of iron castings, and 24,600 tons of switches, frogs, etc.

MINNESOTA IRON COMPANY.

All the stock of this company is owned by the Federal Steel Company. For further information concerning it see page 85.

ELGIN, JOLIET, AND EASTERN RAILWAY COMPANY.

The Elgin, Joliet, and Eastern Railway Company operates 196.36 miles of main line, 32.50 miles of branches and spurs, 27.14 miles of second track, 116.52 miles of sidings, and 6.85 miles of road under trackage rights, making a total of 379.37 miles. The company owns 59 locomotives, 3 passenger cars, one officers' car, and 3,036 box, coal, and other cars. Capital stock, \$6,000,000, all common, and all owned by the Federal Steel Company.

CONNELLSVILLE AND MONONGAHELA RAILWAY COMPANY.

All the stock of this company is owned by the Federal Steel Company. For further information concerning it see page 84.

UNIVERSAL PORTLAND CEMENT COMPANY.

All the stock of the Universal Portland Cement Company is owned by the United States Steel Corporation.

Universal Portland Cement Company; general offices, Commercial National Bank Building, Chicago; branch offices, Frick Building, Pittsburgh, and Chemical Building, St. Louis. *Officers:* Edward M. Hagar, President; Morris Metcalf, Assistant to President; T. J. Hyman, Secretary and Treasurer; B. F. Affleck, General Sales Agent; and J. G. Bergquist, Works Manager.

Capital stock, \$1,000,000, all common. The Universal Portland Cement Company operates or is building in Illinois, Indiana, and Pennsylvania the cement works which are described below:

CEMENT PLANTS—3 COMPLETED AND 2 BUILDING.

Plant No. 1, North Chicago, Illinois. Built in 1895; product, Steel Puzzolan Cement; daily output, 500 barrels. This plant is operated only to supply the consumption of Steel Puzzolan Cement by the subsidiary companies of the United States Steel Corporation. Steel Puzzolan Cement is a mechanical mixture of slag and slaked lime ground together without burning and is suitable only for underground work. The marketing of this brand of cement was discontinued in 1904. (Formerly operated by the Illinois Steel Company.)

Plant No. 2, South Chicago, Illinois. Built in 1899-1900; product, Universal Portland Cement; daily output, 1,500 barrels. (Formerly operated by the Illinois Steel Company.)

Plant No. 3, Buffington, Indiana. Built in 1903-4; product, Universal Portland Cement; daily output, 5,000 barrels. (Formerly operated by the Illinois Steel Company.)

Plant No. 4, Buffington, Indiana. Commenced building in June, 1906; will probably be completed in September, 1907; product, Universal Portland Cement; daily output, 6,000 barrels.

Plant No. 5, Universal, near North Bessemer, Allegheny county, Pa. The town of Universal is located on the Union Railroad, about 1½ miles south of North Bessemer. North Bessemer is located on the Bessemer and Lake Erie Railroad, about half way between the Monongahela and Allegheny rivers. Commenced building in June, 1906; will probably be completed in October, 1907; product, Universal Portland Cement; daily output, 4,500 barrels.

Total present daily output of Universal Portland Cement, 6,500 bar-

rels; total daily output when new plants are completed and put in operation, over 17,000 barrels: total annual output, about 6,000,000 barrels.

Universal Portland Cement is manufactured by burning chilled blast furnace slag and limestone together in rotary kilns and grinding the resulting clinker to a fine powder. It is a true Portland cement of the highest quality. The net weight of a barrel of cement is 380 pounds.

NATIONAL TUBE COMPANY.

All the stock of the National Tube Company is owned by the United States Steel Corporation.

National Tube Company; general offices, Frick Building, Pittsburgh. *Officers at Pittsburgh:* William B. Schiller, President; Edward Worcester, First Vice President; John D. Culbertson, Second Vice President, Treasurer, and Secretary; Taylor Allderdice, Third Vice President; J. W. Downer, General Manager of Sales; B. C. Moise, Assistant Treasurer, Assistant Secretary, and Auditor; S. M. Lynch, Purchasing Agent; and Peter Boyd, General Superintendent.

Sales Agencies: New York City—Clifton Wharton, Jr., Manager of Sales, Battery Park Building. Territory—Pennsylvania east of a line drawn north and south through Altoona, including Altoona; also Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, (with the exception of Cumberland, Maryland, and immediate vicinity, this territory being under the control of the Pittsburgh office,) Virginia, North Carolina, South Carolina, Georgia, and Florida.

Pittsburgh—A. M. Lally, Manager of Sales, Frick Building. Territory—Pennsylvania west of a line drawn north and south through Altoona (Altoona being in New York territory); Kentucky east of a line drawn due south from Louisville, including Louisville; Cumberland, Md., and immediate vicinity; also West Virginia, Ohio, Indiana, and Michigan.

Chicago—H. S. Raymond, Manager of Sales, Commercial National Bank Building. Territory—Illinois north of a line drawn from Danville to Quincy, including Danville; also Wisconsin, Minnesota, Iowa, Nebraska, North Dakota, South Dakota, Colorado, Wyoming, Montana, Idaho, and Utah.

San Francisco—George S. Garritt, Manager of Sales, Crocker Building, Market and Post sts. Territory—Arizona, Nevada, Washington, Oregon, and California.

St. Louis—E. A. Downey, Manager of Sales of the National Tube Works Company, Chemical Building. All sales in the territory named below are made through the National Tube Works Company, which is the agent of the National Tube Company. Territory—Illinois south of a line drawn from Danville to Quincy (Danville being in Chicago territory); Kentucky west of a line drawn due south from Louisville (Louisville being in Pittsburgh territory); and Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Missouri, Kansas, Oklahoma, New Mexico, and Texas; also Indian Territory.

Capital stock, \$80,000,000, of which \$40,000,000 is 7 per cent. cumulative preferred and \$40,000,000 is common. The National Tube Company operates the blast furnaces, rolling mills, steel works, pipe and tube works, and other plants described below:

BLAST FURNACES—6 COMPLETED AND 1 BUILDING.

National Works, Monongahela Furnaces, McKeesport, Pa. Three completed stacks and one stack building: Completed stacks, two, (A and B,) built in 1889-90, and one, (C,) built in 1903-5. Furnace A, 90 x 20, blown in December 1, 1890, and rebuilt in 1900; Furnace B, 90 x 20, blown in June 1, 1891, and rebuilt in 1901; seven Cowper-Kennedy stoves, each 79½ x 21. Furnace C, 90 x 22, blown in December 28, 1905; four Massicks & Crooke hot-blast stoves, each 95 x 22. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 450,000 tons. Equipped with one Uehling pig-iron casting machine. Molten metal from these furnaces is used in the Bessemer converters at the Monongahela Steel Works. Building stack, (D,) to be 90 x 23; construction commenced October 24, 1906; four 3-pass Massicks & Crooke stoves, each 96½ x 22; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 150,000 tons.—*Completed furnaces all active in 1907; building furnace will probably be ready for blast in September, 1907.*

Riverside Works, Riverside Furnaces, Benwood, W. Va. Two stacks: Furnace A, 74½ x 17, built in 1871-2 and first blown in February 14, 1872; remodeled in 1876 and entirely rebuilt in 1889 and 1903; four Massicks & Crooke stoves. Furnace B, 82½ x 21, built in 1901-3 and first blown in March 12, 1903; rebuilt in 1906; four Massicks & Crooke stoves. Fuel, Connellsville coke and by-product coke made from Connellsville coal; ore, Lake Superior; product, Bessemer pig iron; total annual

capacity, 220,000 tons. Equipped with one Uehling pig-iron casting machine.—*Both active in 1907.*

Steubenville Furnace, Steubenville, Ohio. One stack; leased by the Carnegie Steel Company (of New Jersey).—*For complete description see page 10.*

Total annual capacity of the 5 completed furnaces operated by the company, excluding Steubenville Furnace, 670,000 gross tons; of the building furnace, 150,000 tons: total, 820,000 tons.

ROLLING MILLS AND STEEL WORKS—7.

Continental Works, Rolling Mills, Second ave., Pittsburgh. Built in 1862; 30 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one muck, and one 8, one 10, and one 18-inch skelp); product, muck and scrap bar, wrought iron and steel skelp, and socket iron; annual capacity, 27,000 tons of muck and scrap bar and 40,000 tons of skelp and socket iron. Fuel, bituminous coal and producer gas. (Formerly called the Elba Rolling Mills.)

National Works, Boston Mill, McKeesport, Pa. Built in 1891-2; 7 heating furnaces and 3 trains of rolls (one 16-inch roughing and one 12 and one 22-inch finishing); product, wrought iron and steel skelp and socket iron; annual capacity, 80,000 tons. Fuel, coal. (Formerly called the Boston Iron and Steel Works.)

National Works, National Mills, McKeesport, Pa. Built from 1878 to 1896; remodeled in 1905-6; 24 heating furnaces, 5 trains of rolls (one 34 x 110-inch plate, one 16-inch continuous, one 13-inch Belgian, and one 19 and one 22-inch grooved skelp); product, steel skelp; annual capacity, 400,000 tons. Fuel, coal and producer gas. (Formerly called the National Rolling Mills.)

National Works, Monongahela Steel Works, McKeesport, Pa. Built in 1892-3; three 8-gross-ton Bessemer steel converters; first blow made December 14, 1893; 3 cupolas, seven 4-hole soaking pits, one 4-hole Gjers pit, one 200-ton metal mixer, and 2 trains of rolls (one 2-high 36-inch reversing blooming and one 40-inch slabbing); annual capacity, 550,000 tons of ingots and 500,000 tons of billets and slabs. Fuel, producer gas. Molten metal is taken from the Monongahela Furnaces to the metal mixer and thence conveyed to the Bessemer converters in ladles.

National Works, Republic Mills, Twenty-fifth street, South Side, Pittsburgh. Built in 1863 and remodeled in 1906; 44 single puddling furnaces, one muck mill with 2 trains of muck rolls, 24 knobbling fires, 2 refinery fires, 4 steam hammers, one 2-high forge and breakdown mill, 2 reheating furnaces, 3 heating furnaces, and one 12-inch continuous mill; annual capacity, 45,000

tons of charcoal iron skelp and socket iron and 22,000 tons of muck and scrap bar. Fuel, natural gas and coal. (Formerly called the Republic Iron Works.)

Riverside Works, Steel Works, Benwood, W. Va. Built in 1883-4; two 5-gross-ton Bessemer steel converters; first blow made June 11, 1884; two 3-hole soaking pits, three 10-foot cupolas, and one 32-inch reversing blooming mill; product, steel ingots, slabs, and billets; annual capacity, 200,000 tons of ingots and 180,000 tons of slabs and billets. Fuel, producer gas. (Formerly called the Riverside Steel Works.)

Riverside Works, Skelp Mills, Benwood, West Virginia. Built in 1885; 10 regenerative gas heating furnaces and 5 trains of 22-inch grooved rolls; product, steel skelp; annual capacity, 180,000 tons. Fuel, producer gas. (Formerly called the Riverside Skelp Mills.)

Total annual capacity of the 7 rolling mills and steel works: 750,000 gross tons of Bessemer steel ingots, 680,000 tons of Bessemer steel slabs and billets, 745,000 tons of iron and steel skelp and socket iron, and 49,000 tons of muck and scrap bar.

WROUGHT PIPE AND TUBE WORKS.

Allison Works, Thirty-second and Walnut sts., Philadelphia. Product, charcoal iron boiler tubes; sizes, from $1\frac{1}{2}$ to 4 inches inclusive; annual capacity, 8,000 tons.

American Works, Middletown, Pa. Product, wrought black and galvanized pipe; sizes, from $\frac{1}{8}$ of an inch to 16 inches inclusive; annual capacity, 100,000 tons.

Continental Works, Second avenue, Pittsburgh. Product, wrought pipe; sizes, from $\frac{1}{8}$ of an inch to 8 inches inclusive; annual capacity, 60,000 tons. A shop for the manufacture of thread protectors for all the pipe mills of the company is connected with these works.

National Works, McKeesport, Pa. Product, wrought black and galvanized pipe, charcoal iron boiler tubes, and steel boiler tubes; sizes, from $\frac{1}{8}$ of an inch to 30 inches inclusive; annual capacity, 300,000 tons. A galvanizing and kalameining department of this plant is located at Versailles, Pa.

Pennsylvania Works, Second ave., Pittsburgh. Product, wrought pipe; sizes, from 2 to 18 inches inclusive; annual capacity, 180,000 tons.

Riverside Works, Benwood, W. Va. Product, wrought black and galvanized pipe; sizes, from $\frac{1}{8}$ of an inch to 8 inches inclusive; annual capacity, 130,000 tons.

Syracuse Works, Syracuse, N. Y. Product, iron and steel boiler

tubes ; sizes, from 1½ to 7 inches inclusive ; annual capacity, 20,000 tons.

Youngstown Works, Youngstown, Ohio. Product, wrought pipe ; sizes, from 1½ to 16 inches inclusive ; annual capacity, 50,000 tons. Total annual capacity of the 8 pipe and tube works : 848,000 gross tons of wrought black and galvanized pipe and boiler tubes.

SEAMLESS PIPE AND TUBE WORKS.

United States Seamless Tube Works, McKeesport, Allegheny county, Pennsylvania. Product, seamless pipe and tubes.

IRON AND BRASS FOUNDRIES.

American Works, Middletown, Pa. ; product, iron castings ; annual capacity, 400 tons. National Works, McKeesport, Pa. ; product, iron and brass castings ; annual capacity, 9,000 tons of iron and 250 tons of brass castings. Riverside Works, Benwood, W. Va. ; product, iron castings ; annual capacity, 2,000 tons.

Total annual capacity : 11,650 gross tons of iron and brass castings.

COKE OVENS AND IRON-ORE MINES.

Semet-Solvay By-Product and Coke Ovens, Benwood. Number of ovens, 120 ; product, coke from Connellsville coal ; annual capacity, 160,000 net tons. Owned by the National Tube Company but operated under lease by the Semet-Solvay Company.

The National Tube Company owns the Aragon iron-ore mine in the Menominee Range in Dickinson county, Michigan.

SHELBY STEEL TUBE COMPANY.

The majority of the stock of the Shelby Steel Tube Company is owned by the United States Steel Corporation.

Shelby Steel Tube Company ; general offices, Frick Building, Pittsburgh. *Officers at Pittsburgh :* William B. Schiller, President ; Edward Worcester, First Vice President and General Manager of Sales ; John D. Culbertson, Second Vice President, Secretary, and Treasurer ; J. H. Nicholson, Third Vice President ; J. C. Manternach, Auditor ; B. C. Moise, Assistant Treasurer and Assistant Secretary ; S. M. Lynch, Purchasing Agent ; and H. S. White, Assistant General Manager of Sales. *Officer at New York :* H. A. Flagg, Manager of Sales, Battery Park Building. *Officer*

at Chicago : C. H. Wood, Manager of Sales, Commercial National Bank Building.

Territory Covered by New York Sales Agency: Pennsylvania east of a line drawn north and south through Altoona, including Altoona ; also Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida.

Territory Covered by Pittsburgh Office: Pennsylvania west of a line drawn north and south through Altoona (Altoona being in New York territory) ; Kentucky east of a line drawn due south from Louisville, including Louisville ; West Virginia, Ohio, Indiana, Michigan, Arizona, Nevada, Washington, Oregon, and California.

Territory Covered by Chicago Sales Agency: Illinois, Wisconsin, Minnesota, Iowa, Nebraska, North Dakota, South Dakota, Colorado, Wyoming, Montana, Idaho, Utah, and Kentucky west of a line drawn due south from Louisville (Louisville being in Pittsburgh territory) ; and Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Missouri, Kansas, Oklahoma, New Mexico, and Texas ; also Indian Territory.

Capital stock authorized, \$15,000,000, of which \$5,000,000 of 7 per cent. cumulative preferred and \$8,151,500 of common have been issued. The company operates the following works :

ROLLING MILLS—3.

Ellwood Works, (Factory B,) Ellwood City, Pa. Built in 1895 and first put in operation in June of that year ; 2 heating furnaces, one piercing machine, and two 14½-inch trains of rolls ; product, blanks for the manufacture of seamless-drawn steel tubes ; annual capacity, 4,000 tons of blanks. Fuel, bituminous coal.

Greenville Works, (Factory C,) Greenville, Pa. Built in 1896 and first put in operation in May, 1897 ; 2 heating furnaces, one piercing machine, 3 stands of 3-high 20-inch bar mills with 2 continuous heating furnaces, and one 20-inch train of rolls ; product, bars and blanks for the manufacture of seamless-drawn steel tubes ; annual capacity, 15,000 tons of blanks and 50,000 tons of bars. Fuel, bituminous coal and natural gas.

Shelby Works, (Factory A,) Shelby, Ohio. Built in 1890 and first put in operation in July, 1891 ; 5 heating furnaces and 8 hot mills ; product, blanks for the manufacture of seamless-drawn steel tubes ; annual capacity, 20,000 tons of blanks. Fuel, coal, oil, and natural gas.

Total annual capacity of the 3 rolling mills : 39,000 gross tons of blanks for seamless-drawn steel tubes and 50,000 gross tons of bars.

SEAMLESS-DRAWN STEEL TUBE WORKS—3.

Ellwood Works, (Factory B,) Ellwood City, Pa. Product, cold-drawn seamless steel cycle and mechanical tubes; sizes, from $\frac{1}{8}$ of an inch in diameter to $1\frac{1}{2}$ inches; annual capacity, 10,000,000 feet of cycle and mechanical tubes.

Greenville Works, (Factory C,) Greenville, Pa. Product, seamless steel boiler tubes; sizes, from 3 to 5 inches in diameter; annual capacity, 12,000 tons.

Shelby Works, (Factory A,) Shelby, Ohio. Product, cold-drawn seamless steel boiler tubes; sizes, from $\frac{1}{2}$ of an inch in diameter to $3\frac{1}{2}$ inches; also square, rectangular, and special sections; annual capacity, 14,000 tons.

Total annual capacity of the 3 seamless-drawn steel tube works: 10,000,000 feet of cycle and mechanical tubes and 26,000 gross tons of boiler tubes and square, rectangular, and special sections.

SULPHATE OF IRON WORKS.

Shelby Works, (Factory A,) Shelby, Ohio. This plant is used for recovering sulphate of iron from waste pickle.

AMERICAN STEEL AND WIRE COMPANY OF NEW JERSEY.

Practically all the stock of the American Steel and Wire Company of New Jersey is owned by the United States Steel Corporation.

American Steel and Wire Company of New Jersey. *Officers at Cleveland*: Wm. P. Palmer, President; A. S. Chisholm, Assistant to President; E. E. Stone, General Purchasing Agent; and C. A. Vogt, Auditor. *Officers at Chicago*: J. S. Keefe, Vice President; F. Baackes, Vice President and General Sales Agent; A. F. Allen, Secretary and Assistant Treasurer; and F. L. Watson, Treasurer. *Officer at Pittsburgh*: C. L. Miller, Vice President and General Superintendent. *Officer at Worcester, Mass.*: F. H. Daniels, Chief Engineer. *Officer at New York*: J. R. Thomas, Assistant Secretary and Assistant Treasurer.

Sales Offices: F. Baackes, Vice President and General Sales Agent, and D. A. Merriman and G. F. Rummel, Assistant General Sales Agents, Commercial National Bank Building, Chicago; T. H. Taylor, Assistant General Sales Agent, Battery Park Building, New York; G. A. Cragin, Assistant General Sales Agent, 94 Grove

st., Worcester, Mass.; A. T. DeForest, Pacific Coast Sales Agent, Sixteenth and Folsom sts., San Francisco; 160 Central ave., Los Angeles, Cal.; Board of Trade Building, Boston; 19 West Granite st., Butte, Montana; Western Reserve Building, Cleveland; Equitable Building, Denver; Frick Building, Pittsburgh; Ninth and Irving sts., Portland, Oregon; Chemical Building, St. Louis; Pioneer Press Building, St. Paul, Minnesota; Salt Lake City, Utah; and Kansas City, Missouri.

Capital stock issued, \$90,000,000, of which \$40,000,000 is 7 per cent. cumulative preferred and \$50,000,000 is common. Bonded indebtedness, \$78,000. The company operates the following works:

BLAST FURNACES—12.

Breaker Island Furnaces, on Breaker Island, opposite Troy, N. Y.

Three stacks, each 80 x 18, built in 1886-7; twelve Whitwell stoves; fuel, anthracite coal and coke; ore, magnetic from Essex and Columbia counties; product, basic-Bessemer pig iron; total annual capacity, 123,000 tons.—*Idle. Last active in 1897.*

Central Furnaces, Cleveland, Ohio. Three stacks: No. 2, (formerly known as No. 1,) 90 x 22, built in 1881-2 and rebuilt in 1895-6 and 1904; No. 1, (formerly known as No. 2,) 90 x 22, built in 1887 and rebuilt in 1904; and No. 5, 100 x 22, built in 1900-1 and blown in January 17, 1901; Nos. 1 and 2 are each equipped with one Massicks & Crooke stove, 85 x 21, and three Kennedy 2-pass stoves, each 100 x 22, and No. 5 with four Kennedy 2-pass stoves, each 100 x 22; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 510,000 tons. Molten metal is conveyed to the Newburgh Steel Works. Equipped with one Uehling pig-iron casting machine. (Furnaces Nos. 3 and 4 are also located at Cleveland and are also known as Newburgh and Emma.)—*All active in 1907.*

Edith Furnace, Allegheny, Pa. One stack, 97 x 20, built and blown in in 1898; five stoves (one Massicks & Crooke, 85 x 21; two McClure, each 100 x 22; and two Kennedy, each 65 x 18); fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 157,000 tons. Equipped with one Heyl & Patterson pig-iron casting machine.—*Active in 1907.*

Emma Furnace, (now known as No. 4,) Cleveland. One stack, 72 x 17, built in 1872; remodeled in 1882-3, 1890-1, 1896, and 1904; four Kennedy stoves, each 80 x 22; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 110,000 tons. Molten metal is conveyed to the Newburgh Steel Works. One Uehling pig-iron casting machine serves Emma Furnace and Newburgh Furnace.—*Active in 1907.*

Neville Furnace, Neville Island, Allegheny county, Pa. One stack, 100 x 21½, built in 1900-1 and blown in July 3, 1901; four Kennedy 2-pass stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and basic pig iron; annual capacity, 180,000 tons. Equipped with one Uehling pig-iron casting machine. (Formerly called Neville Island Furnace.)—*Active in 1907.*

Newburgh Furnace, (now known as No. 3,) Cleveland. One stack, 62 x 16, built in 1872 and remodeled in 1886; rebuilt in 1895-6; two cast-iron pipe stoves; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 72,000 tons. One Uehling pig-iron casting machine serves Newburgh Furnace and Emma Furnace.—*Active in 1907.*

Shoenberger Furnaces, Pittsburgh. Two stacks, built in 1865 and rebuilt in 1890: No. 1, 75 x 16, has four Massicks & Crooke stoves, one 65 x 18 and three 76 x 16½, and No. 2, 75 x 14, has four Massicks & Crooke stoves, one 85 x 18 and three 57 x 16½; fuel, coke; ore, Lake Superior; product, Bessemer and basic pig iron; total annual capacity, 185,000 tons. Equipped with 2 pig-iron casting machines.—*Both active in 1907.*

Total annual capacity of the 12 furnaces: 1,337,000 gross tons.

ROLLING MILLS AND STEEL WORKS—13.

Allentown Works, Allentown, Pa. Built in 1889 by the Iowa Barb Wire Company; 2 gas heating furnaces, 4 trains of rolls, (9, 10, 14, and 16-inch,) 201 wire-drawing blocks, and 189 wire-nail machines; product, steel wire rods, plain and galvanized wire, barbed wire, staples, wire nails, and wire hoops; annual capacity, 100,000 tons of wire rods, 100,000 tons of wire, and 605,000 kegs of wire nails. Fuel, coal and manufactured gas. A galvanizing plant is connected with the works.

American Works, Cleveland. Built in 1886 by the American Wire Company and first put in operation in November, 1886; new rod mill built in 1888 and first put in operation in January, 1889; one Belgian rod mill with 6 gas producers, 2 heating furnaces, and 4 trains of rolls (two 9, one 12, and one 16-inch); one continuous rod mill with 3 trains of rolls, 3 gas producers, and one heating furnace; and 2,984 wire-drawing blocks; product, steel wire rods, cold-rolled flat wire, and drawn wire; annual capacity, 150,000 tons of rods and 63,000 tons of wire. Fuel, coal. Galvanizing and tinning plants are connected with the works.

Anderson Works, Anderson, Indiana. Built in 1889 by the American Wire Nail Company; 2 continuous heating furnaces, one rod mill with 4 trains of rolls, (one 9, one 10, one 12, and one 18-inch,) 107 wire-drawing blocks, and 165 wire-nail machines; prod-

- uct, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 100,000 tons of rods, 65,000 tons of wire, and 805,000 kegs of nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works.
- Braddock Works, Braddock, Pa. Built in 1891 and put in operation in February, 1892; 3 heating furnaces, 3 trains of rolls, (9, 12, and 16-inch,) 142 wire-drawing blocks, and 117 wire-nail machines; product, steel wire rods, plain and galvanized wire, staples, and wire nails; annual capacity, 75,000 tons of wire rods, 60,000 tons of wire, and 560,000 kegs of wire nails. Fuel, bituminous coal. A galvanizing plant is connected with the works.
- Consolidated Works, Cleveland. Wire-drawing and wire-nail plants built in 1890-1 by the Baackes Wire Nail Company; rod mill added in 1892; 2 heating furnaces, 3 trains of rolls, (9, 12, and 16-inch,) 170 wire-drawing blocks, 268 wire-nail machines, and 71 barbed-wire machines; product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 110,000 tons of rods, 95,000 tons of wire, and 1,300,000 kegs of nails. Fuel, coal and producer gas. A galvanizing plant is connected with the works.
- Donora Works, Donora, Pa. Built in 1900-1 and first put in operation in September, 1901; 5 heating furnaces, one continuous roughing and one right and one left hand Garrett finishing rod mills with 6 trains of rolls, (one 16-inch continuous roughing and two 10 and three 12-inch finishing,) 332 wire-drawing blocks, and 290 wire-nail machines; product, steel wire rods, plain, galvanized, and varnished wire, barbed and woven fence, staples, wire nails, and sulphate of iron; annual capacity, 200,000 tons of wire rods, 160,000 tons of wire, and 1,635,000 kegs of wire nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works. (Owned by the Union Steel Company.)—*See page 71.*
- H. P. Works, Cleveland. Built in 1880 by the H. P. Nail Company and first put in operation in March, 1880; enlarged in 1891; 3 gas heating furnaces, 4 trains of rolls, (one 9, one 10, one 12, and one 16-inch,) 200 wire-drawing blocks, and 675 wire-nail machines; product, steel wire rods, plain wire, wire nails, tacks, staples, spikes, and pole steps; annual capacity, 55,000 tons of rods, 60,000 tons of wire, 1,140,000 kegs of wire nails and tacks, and 7,000 tons of spikes and pole steps. Fuel, coal for boilers and producer gas for the rod mill. A plant for galvanizing nails, spikes, pole steps, etc., is connected with the works.
- Newburgh Steel Works, Cleveland. Bessemer steel works built in 1867-8 and remodeled and fitted with modern appliances in 1893; also remodeled in 1904; first blow made October 15, 1868; two

15-gross-ton converters; annual capacity, 800,000 tons of ingots. Open-hearth steel works built in 1876-8 and rebuilt in 1899-1900; 2 stationary and 4 rolling 50-gross-ton furnaces (one acid and 5 basic); annual capacity, 177,000 tons of ingots. Blooming mill built in 1881 and remodeled in 1891; 20 soaking pits and 2 trains of rolls (one 2-high 38-inch reversing and one 3-high 23-inch); annual capacity, 570,000 tons of blooms, billets, and slabs. New blooming mill built in 1901; 5 soaking pits and one 2-high 35-inch reversing train; annual capacity, 270,000 tons of blooms, billets, and slabs. One rod mill built in 1902; annual capacity, 105,000 tons. Product, Bessemer and open-hearth steel billets and wire rods. Also operate a steel and iron foundry and a machine shop. Fuel, coal and manufactured and natural gas. Molten metal from the Emma and Central furnaces is used.

Rankin Works, Rankin Station, Pa. Built in 1885-6 by the Brad-dock Wire Company; rod mill rebuilt in 1897; 2 heating furnaces, 4 trains of rolls, (two 9, one 12, and one 18-inch,) 199 wire-drawing blocks, 203 wire-nail machines, and 84 barbed-wire machines; product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 110,000 tons of wire rods, 115,000 tons of wire, and 1,120,000 kegs of wire nails. Fuel, bituminous coal and manufactured gas. Galvanizing and woven fencing plants are connected with the works.

Shoenberger Works, Fifteenth st. and Penn ave., Pittsburgh. Established in 1824; 16 gas producers, one annealing and 12 heating furnaces, 5 soaking pits, 10 trains of rolls, (one 8, two 9, and one 16-inch bar, two 2-stand light plate, (one 54 and 60 x 24 and one 60 and 72 x 24-inch,) one 34 x 127-inch plate, 2 blooming, (one 32 and one 36-inch,) and one continuous train,) and 18 horseshoe machines. Open-hearth department added in 1879; first steel made (acid) in summer of that year; first acid blooms rolled September 12, 1879; works now contain three 35-gross-ton basic open-hearth furnaces and two 7-gross-ton Bessemer converters with modern appliances; first basic open-hearth ingots made and first basic open-hearth steel blooms rolled May 5, 1897; first Bessemer ingots made March 17, 1886. Product, basic open-hearth steel plates, sheet steel, skelp steel, iron and steel horseshoe billets, horse and mule shoes, steel blooms, slabs, and billets, horseshoe bars, and toe-calks; annual capacity, 75,000 tons of open-hearth ingots, 330,000 tons of Bessemer ingots, 450,000 tons of blooms, billets, and slabs, 90,000 tons of plates and sheets, 69,000 tons of bars, 23,200 tons of horse and mule shoes, and 800 tons of toe-calks. Fuel, natural gas, manufactured gas, and coal.

South Sharon Works, South Sharon, Pa. Built in 1900-1 and first

put in operation in May, 1901; first wire rods rolled in August, 1901; 4 continuous heating furnaces, 2 reheating furnaces, one continuous billet mill, 2 continuous rod mills, one tinplate bar mill, 180 wire-drawing blocks, and 251 wire-nail machines; product, tinplate bars, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 80,000 tons of tinplate bars, 110,000 tons of wire rods, 88,000 tons of wire, and 1,010,000 kegs of wire nails. Fuel, producer gas and coal. A galvanizing plant is connected with the works. (Owned by the Union Steel Company; formerly called the Sharon Works.)—See page 72.

South Works, Worcester, Mass. Rolling mill built in 1846; 15 heating furnaces, one 34-inch blooming mill, 5 rod mills, and 221 wire-drawing blocks; product, billets, bars, iron, steel, and copper rods, iron, steel, and copper wire, galvanized fence and telegraph wire, barbed wire, staples, springs, wire rope, electrical wires, rail bonds, and sulphate of iron; annual capacity, 155,000 tons of rods, 4,000 tons of bars, and 55,000 tons of wire. Open-hearth steel department contains one 15 and three 20-gross-ton stationary furnaces and four 50-gross-ton rolling furnaces (4 acid and 4 basic); first acid steel made September 26, 1885, and first basic steel made in March, 1891; annual capacity, 55,000 tons of acid and 110,000 tons of basic ingots and 165,000 tons of billets. Fuel, coal and manufactured gas. Galvanizing and tinning plants are connected with the works; also a die foundry.

Waukegan Works, Waukegan, Illinois. Built in 1891 and first put in operation in that year; destroyed by fire in 1899 and immediately rebuilt; put in operation in September, 1900; 4 heating furnaces for 4-inch steel wire billets, one continuous billet mill, and one continuous, one single Belgian, and one double Belgian finishing rod mill, 2,397 wire-drawing blocks, and 32 wire-nail machines; product, steel and copper wire rods, copper wire, dry and liquor finished steel wire, galvanized fence and telegraph and tinned wire, barbed and woven fence, staples, wire nails, wire bale-ties, springs, electrical wires, and sulphate of iron; annual capacity, 175,000 tons of rods, 160,000 tons of wire, and 135,000 kegs of nails. Fuel, coal and coke. Galvanizing and tinning plants are connected with the works; also a die foundry.

Total annual capacity of the 13 rolling mills and steel works: 1,130,000 gross tons of Bessemer steel ingots, 417,000 tons of open-hearth steel ingots, 1,455,000 tons of billets, blooms, slabs, etc., 153,000 tons of merchant and tinplate bars, 90,000 tons of plates and sheets, 24,000 tons of horseshoes and toe-calks, 1,445,000 tons of wire rods, and 2,800 tons of steel and iron castings.

12 WIRE-ROD MILLS, 19 WIRE-DRAWING PLANTS, AND 14
WIRE-NAIL PLANTS.

Allentown Works, Allentown, Pa. Product, steel wire rods, plain and galvanized wire, barbed fence, staples, wire nails, and wire hoops; annual capacity, 100,000 tons of wire rods, 100,000 tons of wire, and 605,000 kegs of wire nails. Wire department: 201 wire-drawing blocks; draws wire from No. 00 to No. 20 gauge. Wire-nail department: 189 nail machines; makes all sizes of wire nails. A galvanizing plant is connected with the works.

American Works, Cleveland. Product, steel wire rods, dry and liquor finished wire, tinned wire, galvanized fence and telegraph wire, shape wire, and cold-rolled flat wire; annual capacity, 150,000 tons of rods, 63,000 tons of wire, and 5,000 tons of cold-rolled flat wire. Wire department: 2,984 wire-drawing blocks; draws wire from $\frac{1}{8}$ of an inch down to No. 40 gauge. Galvanizing and tinning plants are connected with the works. Do not make wire nails.

Anderson Works, Anderson, Ind. Product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 100,000 tons of rods, 65,000 tons of wire, and 805,000 kegs of wire nails. Wire department: 107 wire-drawing blocks; draws wire from No. 000 to No. 21 gauge inclusive. Wire-nail department: 165 nail machines; makes standard sizes of wire nails. A galvanizing plant is connected with the works.

Bluff Street Works, Joliet, Illinois. Product, bright and annealed wire; number of wire-drawing blocks, 81; sizes, from No. 2 to No. 16 gauge; annual capacity, 40,000 tons. Do not roll rods or make wire nails.

Braddock Works, Braddock, Pa. Product, steel wire rods, plain and galvanized wire, staples, and wire nails; annual capacity, 75,000 tons of wire rods, 60,000 tons of wire, and 560,000 kegs of wire nails. Wire department: 142 wire-drawing blocks; draws wire from $\frac{1}{4}$ of an inch down to No. 20 gauge. Wire-nail department: 117 nail machines; makes standard sizes of wire nails. A galvanizing plant is connected with the works.

Central Works, Worcester, Mass. Product, dry and liquor finished wire, galvanized fence and telegraph wire, and tinned wire; number of wire-drawing blocks, 1,432; sizes, from No. 8 to No. 34 gauge; annual capacity, 24,000 tons. Galvanizing and tinning plants are connected with the works. Do not roll rods or make wire nails.

Consolidated Works, Cleveland. Product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails;

annual capacity, 110,000 tons of rods, 95,000 tons of wire, and 1,300,000 kegs of nails. Wire department: 170 wire-drawing blocks; sizes, from rods down to No. 19 gauge. Wire-nail department: 268 nail machines; makes standard sizes of wire nails. A galvanizing plant is connected with the works.

De Kalb Works, De Kalb, Illinois. Product, plain and galvanized wire, barbed and woven fence, poultry netting, staples, wire nails, and sulphate of iron. Wire department: sizes, from No. 0 to No. 20 gauge; number of wire-drawing blocks, 290; annual capacity, 96,000 tons. Wire-nail department: number of machines, 157; standard sizes; annual capacity, 1,030,000 kegs. A galvanizing plant is connected with the works. Do not roll rods.

Donora Works, Donora, Pa. Product, steel wire rods, plain, galvanized, and varnished wire, barbed and woven fence, staples, wire nails, and sulphate of iron; annual capacity, 200,000 tons of rods, 160,000 tons of wire, and 1,635,000 kegs of nails. Wire department: number of wire-drawing blocks, 332; sizes, from No. 00 to No. 20 gauge. Wire-nail department: number of machines, 290; standard sizes. A galvanizing plant is connected with the works. (Owned by the Union Steel Company.)—See page 73.

H. P. Works, Cleveland. Product, steel wire rods, plain wire, wire nails, tacks, staples, spikes, and pole steps; annual capacity, 55,000 tons of rods, 60,000 tons of wire, 1,140,000 kegs of wire nails and tacks, and 7,000 tons of spikes and pole steps. Wire department: number of wire-drawing blocks, 200; sizes, from one inch down to No. 25 gauge. Wire-nail department: number of machines, 675; makes all sizes of wire nails. A plant for galvanizing nails, spikes, pole steps, etc., is connected with the works.

Newburgh Steel Works, Cleveland. Product, steel wire rods; annual capacity, 105,000 tons. Do not draw wire or make wire nails.

Newburgh Wire Works, Cleveland. Product, dry and liquor finished steel wire, galvanized and tinned wire, staples, cold-rolled flat wire and shafting, and sulphate of iron; number of wire-drawing blocks, 3,546; sizes, from $\frac{3}{4}$ of an inch to No. 40 gauge; annual capacity, 115,000 tons of drawn wire, 11,000 tons of cold-rolled flat wire, and 5,500 tons of cold-rolled shafting. Galvanizing and tinning plants are connected with the works. Do not roll rods or make wire nails.

North Works, Worcester, Mass. Product, steel, iron, and copper wire, dry and liquor finished wire, galvanized and tinned wire, cold-rolled flat wire, wire nails, wire bale-ties, and sulphate of iron; rope, music, and other high-grade wires a specialty. Wire department: number of wire-drawing blocks, 4,817; all sizes

down to .003 of an inch in diameter; annual capacity, 58,000 tons. Wire-nail department: number of machines, 103; all sizes and kinds; annual capacity, 245,000 kegs. Also 13,000 tons of cold-rolled flat wire. Galvanizing and tinning plants are connected with the works. Do not roll rods.

Pacific Works, San Francisco. Product, woven fence, staples, wire bale-ties, springs, wire rope, and wire cable; annual capacity, 4,800 tons of wire rope and wire cable. Do not roll rods or make wire nails.

Rankin Works, Rankin Station, Pa. Product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 110,000 tons of wire rods, 115,000 tons of wire, and 1,120,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 199; sizes, from No. 00 to No. 20 gauge. Wire-nail department: number of nail machines, 203; standard sizes. A galvanizing plant is connected with the works.

Rockdale Works, near Joliet, Illinois. Product, plain and galvanized wire, barbed and woven fence, poultry netting, staples, wire nails, and sulphate of iron; annual capacity, 100,000 tons of wire and 195,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 325; sizes, from No. 2 to No. 22 gauge inclusive. Wire-nail department: number of nail machines, 20 double and one single; standard sizes. A galvanizing plant is connected with the works. Do not roll rods.

Salem Works, Salem, Ohio. Product, wire and wire nails. Wire department: number of wire-drawing blocks, 53; sizes, from rods down to No. 21 gauge; annual capacity, 23,000 tons. Wire-nail department: number of machines, 155; sizes, from 2-penny to 60-penny inclusive; annual capacity, 495,000 kegs. Do not roll rods.

Scott Street Works, Joliet, Illinois. Product, plain and galvanized wire, barbed fence, staples, wire nails, wire hoops, and sulphate of iron. Wire department: number of wire-drawing blocks, 200; sizes, from No. 00 to No. 18 gauge inclusive; annual capacity, 100,000 tons. Wire-nail department: number of machines, 249; standard sizes; annual capacity, 1,345,000 kegs. A galvanizing plant is connected with the works. Do not roll rods.

South Sharon Works, South Sharon, Pa. Product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 110,000 tons of rods, 88,000 tons of wire, and 1,010,000 kegs of nails. Wire department: number of wire-drawing blocks, 180; sizes, from $\frac{3}{8}$ of an inch to No. 22 gauge. Wire-nail department: number of machines, 251; standard sizes. A galvanizing plant is connected with the works. (Owned by

the Union Steel Company; formerly called the Sharon Works.)
—See page 73.

South Works, Worcester, Mass. Product, iron, steel, and copper wire rods, dry and liquor finished wire, copper wire, galvanized fence and telegraph wire, barbed fence, staples, springs, wire rope and wire strand, electrical wire, rail bonds, and sulphate of iron; annual capacity, 155,000 tons of rods, 55,000 tons of wire, and 18,000 tons of wire rope and wire strand. Wire department: number of wire-drawing blocks, 221; draws steel wire from $\frac{1}{2}$ of an inch to No. 20 gauge and copper wire from $\frac{3}{4}$ of an inch to No. 20 gauge. Galvanizing and tinning plants are connected with the works. Do not make wire nails.

Waukegan Works, Waukegan, Illinois. Product, steel and copper wire rods, copper wire, dry and liquor finished steel wire, galvanized fence and telegraph wire; tinned wire, barbed and woven fence, staples, wire nails, wire bale-ties, springs, electrical wires, and sulphate of iron; annual capacity, 175,000 tons of rods, 160,000 tons of wire, and 135,000 kegs of nails. Wire department: number of wire-drawing blocks, 2,397; draws wire from $\frac{1}{2}$ of an inch to No. 34 gauge. Wire-nail department: number of machines, 32; sizes, from 3-penny to 30-penny. Galvanizing and tinning plants are connected with the works.

Total annual capacity of the 12 wire-rod mills, 19 wire-drawing plants, and 14 wire-nail plants: 1,445,000 gross tons of wire rods, 1,577,000 tons of wire, 11,620,000 kegs of wire nails of 100 pounds, 7,000 tons of spikes and pole steps, 5,500 tons of cold-rolled shafting, 29,000 tons of cold-rolled flat wire, 734,400 tons of galvanized wire, 30,600 tons of tinned market and other wire, and 22,800 tons of wire rope, wire strand, and wire cable.

FOUNDRIES, HORSESHOE WORKS, AND SPRING WORKS.

Newburgh Steel Works, Cleveland. Product, acid and basic open-hearth steel castings for miscellaneous mill machinery and gray iron castings for machine parts, all for the consumption of the company; annual capacity, 800 tons of steel castings and 2,000 tons of iron castings.

Pacific Works, San Francisco, California. Product, extension, compression, and torsion springs for furniture, etc.; annual capacity, 500 tons.

Shoenberger Works, Pittsburgh. Product, horse and mule shoes, toe-calks, etc.; annual capacity, 23,200 tons of horse and mule shoes and 800 tons of toe-calks.

South Works, Worcester, Mass. Product, extension, compression, torsion, and flat springs of all kinds for agricultural implements,

furniture, railway equipment, and other purposes; annual capacity, 8,800 tons.

Waukegan Works, Waukegan, Ill. Product, extension, compression, and torsion springs of all kinds for agricultural implements, furniture, and other purposes; annual capacity, 6,000 tons.

Total annual capacity of the 5 works: 15,300 tons of springs, 800 tons of open-hearth steel castings, 2,000 tons of gray iron castings, 23,200 tons of horse and mule shoes, and 800 tons of toe-calks.

COLD-ROLLED SHAFTING, FLAT WIRE, WIRE ROPE, WIRE CABLE, SPIKES, POLE STEPS, ETC.

American Works, Cleveland. Product, cold-rolled flat wire; annual capacity, 5,000 tons.

H. P. Works, Cleveland. Product, spikes and pole steps; annual capacity, 7,000 tons.

Newburgh Wire Works, Cleveland. Product, cold-rolled flat wire and shafting; annual capacity, 11,000 tons of flat wire and 5,500 tons of shafting.

North Works, Worcester, Mass. Product, cold-rolled flat wire; annual capacity, 13,000 tons.

Pacific Works, San Francisco, California. Product, wire rope and wire cable; annual capacity, 4,800 tons.

South Works, Worcester, Mass. Product, wire rope and wire strand; annual capacity, 18,000 tons.

Waukegan Works, Waukegan, Illinois. Building a factory for the manufacture of insulated wire and cables.

Total annual capacity of the 6 completed works: 5,500 gross tons of cold-rolled shafting, 29,000 tons of cold-rolled flat wire, 22,800 tons of wire rope, wire strand, and wire cable, and 7,000 tons of spikes and pole steps. Will also make insulated wire.

COLD-DRAWN STEEL WORKS.

Newburgh Wire Works, Cleveland, Ohio. Product, cold-drawn steel shafting and machine screw stock. Sizes: rounds, from $\frac{1}{8}$ of an inch to 6 inches; flats, from $\frac{1}{4} \times \frac{1}{8}$ of an inch to $\frac{1}{2}$ of an inch by $1\frac{1}{2}$ inches; squares, from $\frac{1}{8}$ of an inch to $1\frac{1}{2}$ inches; and hexagons, from $\frac{1}{8}$ of an inch to 2 inches. Annual capacity, 5,500 tons.

North Works, Worcester, Mass. Product, cold-drawn steel shafting and screw stock. Sizes: rounds, from $\frac{1}{8}$ of an inch to $1\frac{1}{2}$ inches; squares and hexagons, from $\frac{1}{8}$ of an inch to $\frac{7}{8}$ of an inch; and flats, from $\frac{1}{8}$ of an inch to $\frac{1}{2}$ of an inch thick by $\frac{1}{8}$ of an inch to $2\frac{1}{2}$ inches wide. Annual capacity, 1,200 tons.

Total annual capacity of the 2 works: 6,700 gross tons.

GALVANIZED WIRE, FENCE WIRE, NAILS, ETC.

- Allentown Works, Allentown, Pa. Number of galvanizing pans, 3 wire and one nail; annual capacity, 54,000 tons of galvanized wire and 500 tons of galvanized nails.
- American Works, Cleveland. Number of galvanizing pans, 3; product, fence and telegraph wire; annual capacity, 24,500 tons.
- Anderson Works, Anderson, Indiana. Number of galvanizing pans, 2; product, fence wire; annual capacity, 35,000 tons.
- Braddock Works, Braddock, Pa. Number of galvanizing pans, 2; product, fence wire; annual capacity, 20,000 tons.
- Central Works, Worcester, Mass. Number of galvanizing pans, 3; product, fence and telegraph wire; annual capacity, 4,900 tons.
- Consolidated Works, Cleveland. Number of galvanizing pans, 3; product, fence wire; annual capacity, 55,000 tons.
- De Kalb Works, De Kalb, Illinois. Number of galvanizing pans, 4; product, fence and netting wire; annual capacity, 51,000 tons.
- Donora Works, Donora, Pa. Number of galvanizing pans, 6; number of revolving nail galvanizing furnaces, 2; annual capacity, 85,000 tons of galvanized fence wire and 1,500 tons of galvanized nails. (Owned by the Union Steel Company.)—*See page 73.*
- H. P. Works, Cleveland. Number of revolving nail galvanizing furnaces, 6; number of nail galvanizing pans, 1; product, galvanized nails, spikes, pole steps, etc.; annual capacity, 7,000 tons.
- Newburgh Wire Works, Cleveland. Number of galvanizing pans, 3; product, fence wire; annual capacity, 48,000 tons.
- North Works, Worcester, Mass. Number of galvanizing pans, 3; product, fine and flat wire; annual capacity, 2,000 tons.
- Rankin Works, Rankin Station, Pa. Number of galvanizing pans, 4; product, fence wire; annual capacity, 80,000 tons.
- Rockdale Works, near Joliet, Illinois. Number of galvanizing pans, 6; product, fence and netting wire; annual capacity, 94,000 tons.
- Scott Street Works, Joliet. Number of galvanizing pans, 3; number of nail galvanizing furnaces, 6; annual capacity, 50,000 tons of galvanized fence wire and 4,000 tons of galvanized nails.
- South Sharon Works, South Sharon, Pa. Number of galvanizing pans, 3; product, fence wire; annual capacity, 48,000 tons. (Owned by the Union Steel Company; formerly called the Sharon Works.)—*See page 73.*
- South Works, Worcester, Massachusetts. Number of galvanizing pans, 8; product, fence, telegraph, and armor wire; annual capacity, 16,000 tons.
- Waukegan Works, Waukegan, Illinois. Number of galvanizing pans, 7; product, fence and telegraph wire and pump rods; annual capacity, 67,000 tons.

Total annual capacity of the 17 works: 734,400 gross tons of galvanized fence, telegraph, netting, flat, and other wire and 13,000 tons of other galvanized products: total, 747,400 tons.

TINNED MARKET, MATTRESS, BROOM, AND OTHER WIRE.

American Works, Cleveland. Number of tinning furnaces, 8; product, market, broom, mattress, bottling, and other wire; annual capacity, 3,500 tons.

Central Works, Worcester, Mass. Number of tinning furnaces, 4; product, mattress and broom wire; annual capacity, 1,600 tons.

Newburgh Wire Works, Cleveland. Number of tinning furnaces, 20; product, market, mattress, broom, and fine wire; annual capacity, 9,000 tons.

North Works, Worcester, Mass. Number of tinning furnaces, 15; product, market, mattress, broom, fine, flat, card, music, and other wire; annual capacity, 6,000 tons.

South Works, Worcester, Mass. Number of tinning furnaces, 1; product, tinned copper wire; annual capacity, 2,500 tons.

Waukegan Works, Waukegan. Tinning furnaces, 15; product, market, mattress, broom, and fine wire; annual capacity, 8,000 tons.

Total annual capacity of the 6 works: 30,600 gross tons.

SULPHATE OF IRON PLANTS.

De Kalb Works, De Kalb, Illinois. Annual capacity, 2,500 tons.

Donora Works, Donora, Pa. Annual capacity, 4,500 tons. (Owned by the Union Steel Company.)—See page 74.

Newburgh Wire Works, Cleveland. Annual capacity, 6,000 tons.

North Works, Worcester, Mass. Annual capacity, 4,500 tons.

Rockdale Works, near Joliet, Illinois. Annual capacity, 4,000 tons.

Scott Street Works, Joliet, Illinois. Annual capacity, 4,000 tons.

South Works, Worcester, Mass. Annual capacity, 4,500 tons.

Waukegan Works, Waukegan, Illinois. Annual capacity, 9,000 tons.

Total annual capacity of the 8 works: 39,000 gross tons.

DIE FOUNDRIES.

South Works, Worcester, Mass. Product, chilled iron dies and round dies for the use of the company; annual capacity, 990 net tons.

Waukegan Works, Waukegan, Illinois. Product, chilled iron dies for the use of the company; annual capacity, 350 net tons.

Total annual capacity of the 2 die foundries: 1,340 net tons.

IRON-ORE MINES, COKE OVENS, AND LIMESTONE QUARRIES.

The American Steel and Wire Company of New Jersey, through the American Mining Company, controls the Sauntry iron-ore mine in St. Louis county, Minnesota, the Alpena mine, adjoining the Saun-

try mine on the north, the Clark mine, and the Chisholm mine, all in the Mesabi Range; the Atlantic mine at Iron Belt, Wisconsin, in the Gogebic Range; the Moore and Stegmiller mines in Michigan, in the Marquette Range; and the Cuff mine, in Dickinson county, and the Hill Top mine, at Crystal Falls, Mich., in the Menominee Range, all located in the Lake Superior iron-ore region. It also owns a half interest in 250 coke ovens at Dawson, Fayette county, Pa., operated by the Juniata Coke Company; it also operates limestone quarries at Williamsburg, Blair county, Pa.

AMERICAN MINING COMPANY.

All the capital stock of the American Mining Company is owned by the American Steel and Wire Company of New Jersey. For further information concerning this company see page 87.

EDGAR ZINC COMPANY.

Four-fifths of the capital stock of the Edgar Zinc Company is owned by interests identified with the United States Steel Corporation.

Edgar Zinc Company; general offices, Security Building, St. Louis. *Officers*: S. C. Edgar, President and General Manager; Alfred Clifford, Vice President; W. B. Edgar, Secretary and Treasurer; and S. C. Edgar, Jr., Assistant General Manager. Capital stock, \$1,000,000. The Edgar Zinc Company operates the following zinc plants in Kansas and Missouri:

ZINC WORKS—2.

Carondelet Works, Carondelet Station, St. Louis. Number of retorts, 2,000; annual capacity, 8,500 net tons of spelter. Cherryvale Works, Cherryvale, Montgomery county, Kansas. Number of retorts, 4,800; annual capacity, 22,500 net tons of spelter. Total annual capacity of the 2 works: 31,000 net tons of spelter.

THE TRENTON IRON COMPANY.

The Trenton Iron Company; general offices, Trenton, N. J.; branch offices, 17 Burling Slip, New York. *Officers at Trenton*: H. G. Stoddard, President and Treasurer; Eagleton Hanson, Secretary; and

T. F. McGuire, Purchasing Agent. *Officer at New York:* Erskine Hewitt, Vice President. Capital stock, \$600,000, all common. The Trenton Iron Company operates the following works:

DRAWN WIRE, COLD-ROLLED FLAT WIRE, WIRE ROPE,
WIRE CABLE, ETC.

The works of the Trenton Iron Company were originally built in 1845. Until 1905 they were equipped with 3 heating furnaces, one 3-ton hammer, one 12-inch train of rolls, and one wire-rod mill containing two 12 and two 10-inch trains of rolls. This equipment was dismantled in 1905.

The works are now equipped with 700 wire-drawing blocks and 100 trains of 6 to 12-inch cold rolls, the latter for manufacturing flat wire; product, all sizes of common and high-grade iron and steel wire; also liquor finished, tinned, and galvanized wire; also rope wire and piano wire.

A department for the manufacture of wire rope and wire cable is also connected with the works. In this department patent locked wire rope, which is manufactured by the Trenton Iron Company only, is made.

Total annual capacity of the works: 17,000 tons of wire, 3,400 tons of wire rope and wire cable, and 2,700 tons of cold-rolled flat wire.

AMERICAN SHEET AND TIN PLATE COMPANY.

Practically all the stock of the American Sheet and Tin Plate Company is owned by the United States Steel Corporation. The American Sheet and Tin Plate Company was formerly called the American Sheet Steel Company. On December 31, 1903, it purchased all the property of the American Tin Plate Company and changed its name to the American Sheet and Tin Plate Company. Unless otherwise stated rolling mill capacities are given on triple turn and in gross tons of 2,240 pounds.

American Sheet and Tin Plate Company; general offices, Frick Building, Pittsburgh. *Officer at New York:* George G. McMurtry, Chairman of Board of Directors, post-office box 814. *Officers at Pittsburgh:* Charles W. Bray, President; E. W. Pargny, First Vice President; S. A. Davis, Second Vice President; C. W. Bennett, Assistant to President; H. B. Wheeler, Secretary and Treasurer; H. L. Austin, Auditor; M. S. Dennis, Purchasing Agent; and G. C. Kimball, Chief Engineer.

District Sales Agencies: Battery Park Building, New York; Pennsylvania Building, Philadelphia; Commercial National Bank

Building, Chicago; Chemical Building, St. Louis; Penobscot Building, Detroit; Union Trust Building, Cincinnati; Hennen Building, New Orleans; Wilson Building, Dallas, Texas; Equitable Building, Denver; Crocker Building, San Francisco; and Ainsworth Block, Portland, Oregon.

Capital stock, \$49,000,000, of which \$24,500,000 is 7 per cent. cumulative preferred and \$24,500,000 is common. The American Sheet and Tin Plate Company operates the following plants:

ROLLING MILLS AND STEEL WORKS—37.

Aetna-Standard Works, Bridgeport, Ohio. Built in 1872 and since enlarged; 6 regenerative gas heating furnaces, 6 pair and 6 sheet furnaces, 11 combination pair and sheet furnaces, 16 double box annealing furnaces, one 3-high 30 x 66-inch plate mill, 5 jobbing mills, (one 28 x 60, two 28 x 54, and two 28 x 50-inch,) 17 hot sheet mills, (one 24 x 34, nine 26 x 38, four 26 x 34, and three 26 x 44-inch,) and 6 cold mills (one 22 x 54, three 22 x 46, and two 22 x 44-inch); product, black sheets, galvanized sheets, and painted and formed roofing; annual capacity, 121,000 tons of black sheets. Fuel, natural gas and coal. Also operate galvanizing, corrugated roofing, and metal lath plants.

American Works, Elwood, Indiana. Built in 1891-2 and first put in operation in June, 1892; 28 pair and 28 sheet furnaces, 4 annealing furnaces, twenty-eight 26 x 32-inch hot tin mills, and twenty-two 20 x 42-inch cold mills; product, black plates for tin and terne plates; annual capacity, double turn, 68,400 tons. Fuel, coal. Make tin and terne plates. A plant for the manufacture of sulphate of iron is connected with the works.

Anderson Works, Anderson, Indiana. Built in 1894-5 and put in operation August 1, 1895; 7 double heating furnaces, one large annealing furnace, seven 25 x 32-inch hot tin mills, and five 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 17,000 tons. Fuel, coal and a limited quantity of natural gas. Make tinplates.

Cambridge Works, Cambridge, Ohio. Built in 1894 and first put in operation December 26, 1894; 7 double heating furnaces, 4 annealing furnaces, 7 hot tin mills, (one 26 x 28, five 26 x 32, and one 26 x 36-inch,) and 7 cold mills (two 22 x 40 and five 22 x 36-inch); product, black plates for tinning; annual capacity, 18,000 tons. Fuel, bituminous coal.

Canton Works, Canton, Ohio. Built in 1894 and first put in operation in August, 1894; one pair, one sheet, and 4 combination sheet and pair furnaces, 4 single annealing furnaces, 5 hot sheet mills, (three 26 x 38 and two 26 x 34-inch,) and 2 cold sheet

mills (one 22 x 44 and one 22 x 40-inch); product, iron and steel black sheets for stamping and roofing; annual capacity, 14,200 tons. Fuel, coal.

Chester Works, Chester, W. Va. Built in 1899-1900 by the Chester Rolling Mill Company and equipped with machinery for the manufacture of sheet steel; acquired by the American Sheet Steel Company in 1900; purchased by the American Tin Plate Company in 1901 and equipped with machinery for the manufacture of black plates; first black plates made in December, 1901. Works now have 7 sheet furnaces, 7 pair furnaces, 4 annealing furnaces, 7 hot mills, (one 26 x 44-inch sheet and two 26 x 34, three 26 x 32, and one 26 x 26-inch black plate,) and 7 cold mills (one 26 x 52, three 22 x 32, and three 22 x 40-inch); product, black plates for tinning and large sheets; annual capacity, 19,300 tons. Fuel, coal. Make tin and terne plates.

Crescent Works, Cleveland. Built in 1895 and first put in operation June 1, 1895; 6 pair and 6 heating furnaces, one double annealing furnace, 6 hot tin mills, (four 26 x 30 and two 26 x 34-inch,) and 7 cold mills (six 22 x 38 and one 22 x 40-inch); product, black plates for tinning and stamping; annual capacity, 15,200 tons. Fuel, coal. Make tinplates.

Dover Works, Canal Dover, Ohio. Built in 1865-6 and enlarged in 1895; first iron rolled in 1866; 7 pair, 6 sheet, and 4 combination pair and sheet furnaces, 5 single and 2 double annealing furnaces, 10 hot sheet mills, (three 26 x 34, three 26 x 38, two 28 x 38, and two 28 x 48-inch,) and 4 cold mills (three 24 x 48 and one 24 x 52-inch); also a complete galvanizing, pickling, painting, and forming plant; product, light plates, black and galvanized, painted and formed, and cold-rolled sheet steel; annual capacity, 36,850 tons of black sheets and 28,300 tons of galvanized sheets. Fuel, coal. Adding one sheet mill with combination sheet and pair furnace; annual capacity, 3,500 tons; will probably be completed early in 1908.

Dresden Works, Dresden, Ohio. Built and put in operation in 1898; 4 sheet furnaces, 4 pair furnaces, 2 double annealing furnaces, 4 hot sheet mills, (one 26 x 48, one 26 x 38, and two 26 x 34-inch,) and 2 cold mills (one 24 x 48 and one 24 x 52-inch); product, iron and steel sheets; annual capacity, 11,500 tons. Fuel, coal.

Falcon Works, Niles, Ohio. Built in 1892-3 and first put in operation in April, 1893; 12 sheet and pair furnaces, one annealing furnace, 6 hot tin mills, (one 26 x 32 and five 25 x 38-inch,) and 5 cold mills (one 22 x 40 and four 22 x 36-inch); product, black plates for tinning; annual capacity, 14,900 tons. Fuel, bituminous coal. Make tin and terne plates.—*Idle; closed indefinitely.*

Guernsey Works, Cambridge, Ohio. Built in 1889-90 and put in operation in July, 1890; 5 sheet and 5 pair furnaces, 2 combination sheet and pair furnaces, 6 double annealing furnaces, 7 hot sheet mills, (four 26 x 38, one 26 x 44, and two 26 x 34-inch,) and three 24 x 50-inch cold mills; product, black sheets, painted and formed roofing, and galvanized sheets; annual capacity, 23,500 tons of sheet steel. Fuel, natural gas and coal. Brand for galvanized sheets, "Apollo C" in a diamond. Also operate a galvanizing plant. Four 26-inch hot sheet mills are being added.

Humbert Works, South Connellsville, Pa. Built in 1896 and first put in operation October 31, 1896; 6 double sheet and pair furnaces, one annealing furnace, and six 26 x 32-inch hot and six 23 x 36-inch cold mills; product, black plates for tinning; annual capacity, 14,500 tons. Fuel, coal or natural gas. Make tinplates.

Hyde Park Works, Hyde Park, Pa. Built in 1895 and first put in operation September 1, 1895; 5 Bailey combination sheet and pair furnaces, one single sheet furnace, one single pair furnace, 7 annealing furnaces, 6 hot sheet mills, (five 24 x 40 and one 26 x 40-inch,) and 2 cold mills (one 24 x 44 and one 24 x 40-inch); product, fine grades of soft steel sheets for stamping, japanning, tinning, galvanizing, and armatures, double annealed and cold rolled and cold rolled and annealed finishes; annual capacity, 18,000 tons of sheets. Fuel, natural gas.

La Belle Works, Wheeling, W. Va. Black plate mill added to a rolling mill in 1893 and first black plates made in April, 1894; 10 sheet and 10 pair furnaces, 4 annealing furnaces, 10 hot tin mills, (one 26 x 36, five 26 x 34, and four 26 x 32-inch,) and 10 cold mills (four 22 x 32, four 24 x 32, one 22 x 40, and one 24 x 40-inch); product, black plates for tinning; annual capacity, 25,350 tons. Fuel, natural gas. Make tinplates.

Laughlin Works, Martins Ferry, Ohio. Black plate mill added to a rolling mill in 1895 and first black plates made in August, 1895; 23 sheet and 23 pair furnaces, 5 annealing furnaces, 23 hot tin mills, (seventeen 26 x 32, five 26 x 34, and one 26 x 38-inch,) and twenty-two 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 57,000 tons. Fuel, natural gas and coal. Make tin and terne plates.

Leechburg Works, Leechburg, Pa. Built in 1872; 11 combination pair and sheet furnaces, 5 double annealing furnaces, 11 hot sheet mills, (nine 26 x 40 and two 24½ x 38-inch,) and 4 cold mills (one 23 x 50 and three 24 x 44-inch); product, steel sheets; annual capacity, 34,900 tons. Fuel, natural gas and coal.

Mercer Works, South Sharon, Pa. Built in 1901-3 and rebuilt in 1904-5; first put in operation in August, 1905; 4 double pair and 5 double sheet furnaces, 3 annealing furnaces, 14 hot sheet mills, (nine 28 x 40-inch roughing and five 28 x 38-inch finishing,) and four 22 x 48-inch cold mills; product, black sheets; annual capacity, 38,400 tons. Fuel, coal and producer gas. (Formerly called the South Sharon Sheet Mill; later the Sharon Works; owned by the Union Steel Company.)—See page 71.

Midland Works, Muncie, Indiana. Built in 1892 and first put in operation October 10, 1892; 7 pair and 7 sheet furnaces, 4 double annealing furnaces, 7 hot sheet mills, (two 26 x 40, four 26 x 36, and one 26 x 44-inch,) and 4 cold mills (one 24 x 56, one 22 x 50, one 22 x 44, and one 24 x 44-inch); product, stamping sheets; annual capacity, 22,500 tons. Fuel, coal exclusively.

Monongahela Works, South Fifteenth street, Pittsburgh. Built in 1894-5 and first put in operation February 14, 1895; 6 continuous pair furnaces, 2 double sets of annealing furnaces, eight 26 x 32-inch hot tin mills, and five sets of 21 x 34-inch tandem fashion cold mills; also one semi-continuous Bray mill; product, black plates for tinning; annual capacity, 25,600 tons. Fuel, bituminous coal. Make tin and terne plates.

Morewood Works, Gas City, Indiana. Built in 1892-3 and first put in operation in December, 1893; 8 sheet and 8 pair furnaces, 2 annealing furnaces, 8 hot 24 x 32-inch tin mills, and 8 pair of 24 x 32-inch cold mills; product, black plates for tinning; annual capacity, 19,350 tons. Fuel, coal. Make tinplates. An iron and brass foundry is connected with the works.

National Works, Monessen, Pa. Built in 1897-8 and first put in operation in January, 1898; 25 sheet and 25 pair furnaces, 10 annealing furnaces, twenty-five 26 x 32-inch hot tin mills, and twenty-one 22 x 32-inch cold mills; product, black plates for tinning; annual capacity, 58,550 tons. Fuel, coal. Make tin and terne plates.

New Castle Works, New Castle, Pa. Built in 1892-3 and first put in operation in October, 1893; 20 pair and 20 sheet furnaces, 6 annealing furnaces, twenty 24 x 32-inch hot tin mills, and twenty-four 20 x 22-inch cold mills; product, black plates for tinning; annual capacity, 51,300 tons. Fuel, bituminous coal. Make tin and terne plates.

New Philadelphia Works, New Philadelphia, Ohio. Built in 1883; 6 pair, 6 sheet, and 3 combination pair and sheet furnaces, one softening and 4 double annealing furnaces, 9 hot sheet mills, (one 28 x 48, four 28 x 38, and four 26 x 34-inch,) one 28 x 60-inch jobbing mill, and 4 cold mills (one 24 x 50 and three 24 x 44-inch); product, light plates, black sheets, and cold-rolled sheet

steel; annual capacity, 39,350 tons. Fuel, coal. Adding one 28 x 60-inch jobbing mill and one 28 x 48-inch sheet mill; will probably be completed in 1908.

Old Meadow Works, Scottdale, Pa. Built and put in operation in 1898; 8 pair and 8 sheet furnaces, 7 single annealing furnaces, 8 hot sheet mills, (one 26 x 50, two 26 x 44, and five 26 x 38-inch,) and 3 cold mills (one 28 x 56, one 24 x 38, and one 24 x 50-inch); product, sheet iron; annual capacity, 28,500 tons. Fuel, natural gas and coal. (Formerly called Scottdale Works No. 2.)

Pennsylvania Works, New Kensington, Pa. Built in 1894 and first put in operation in 1895; 8 sheet and 8 pair furnaces, 2 annealing furnaces, 8 hot tin mills, (four 26 x 30, two 26 x 32, and two 26 x 36-inch,) and 12 cold mills (eight 22 x 36 and four 24 x 36-inch); product, black plates for tinning; annual capacity, 14,400 tons. Fuel, coal. Make tinplates.

Piqua Works, Piqua, Ohio. Built in 1889; 4 combination pair and sheet furnaces, 5 single annealing furnaces, 2 pile furnaces, 3 single puddling furnaces, one single busheling furnace, one 3-high 23-inch bar mill, 4 hot sheet mills, (one 26 x 40 and three 26 x 36-inch,) and 2 cold mills (one 24 x 34 and one 24 x 40-inch); product, sheet bars and iron and steel sheets; annual capacity, 15,000 tons of sheet bars and 11,100 tons of sheets. Fuel, coal.

Pittsburgh Works, New Kensington, Pa. Built in 1894 and first put in operation in December, 1894; 8 sheet and 8 pair furnaces, 2 double annealing furnaces, 8 hot tin mills, (five 26 x 30, one 26 x 33, and two 26 x 36-inch,) and 8 cold mills (three 22 x 36, three 24 x 36, and two 22 x 40-inch); product, black plates for tinning and soft stamping sheets; annual capacity, 17,200 tons. Fuel, bituminous coal. Make tinplates.

Sabraton Works, Morgantown, W. Va. Partly built by the Rolling Mill Company of America in 1902; completed as a 6-mill plant by the Morgantown Tin Plate Company in 1903-4; rebuilt and enlarged by the American Sheet and Tin Plate Company in 1905-6; first put in operation April 16, 1906; 10 pair furnaces, 10 sheet furnaces, 2 annealing furnaces, ten 26 x 32-inch hot tin mills, and twelve 23 x 32-inch cold mills; product, black plates for tinning; annual capacity, 23,500 tons. Fuel, natural gas. Make tinplates. (Formerly owned but never operated by the Morgantown Tin Plate Company.)

Saltsburg Works, Saltsburg, Pa. Built in 1894-5 and first put in operation July 1, 1895; 4 pair, 4 sheet, and 4 single annealing furnaces, four 24½ x 39-inch hot sheet mills, and 2 cold mills (one 24 x 44 and one 24 x 40-inch); product, fine sheet iron; annual capacity, 12,400 tons. Fuel, coal.

Scottdale Works, Scottdale, Pa. Built in 1873 and remodeled in 1894 and 1897; 7 pair and 9 sheet furnaces, 7 double annealing furnaces, 9 hot sheet mills, (two 24 x 44, one 24 x 38, and six 22 x 38-inch,) and 3 cold mills (one 24 x 44, one 22 x 38, and one 24 x 50-inch); product, black steel sheets; annual capacity, 29,400 tons. Fuel, natural gas, coal, and coke. A galvanizing plant is now being added; also 6 double annealing furnaces; will probably be ready for operation in January, 1908. (Formerly called Scottdale Works No. 1.)

Shenango Works, New Castle, Pa. Built in 1897-8 and first put in operation in April, 1899; 30 sheet furnaces, 30 pair furnaces, 9 annealing furnaces, thirty 26 x 32-inch hot tin mills, and thirty 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 76,000 tons. Fuel, coal. Make tin and terne plates.

South Sharon Works, South Sharon, Pa. Built in 1900-1 and first put in operation May 16, 1901; 20 sheet and pair furnaces, 6 double annealing furnaces, twenty 26 x 32-inch hot tin mills, and 21 sets of 22 x 40-inch cold mills; product, black plates for tinning; annual capacity, 50,500 tons. Fuel, manufactured gas and coal. Make tinplates. A plant for the manufacture of sulphate of iron is connected with the works. (Owned by the Sharon Tin Plate Company; controlled by the Union Steel Company and the American Sheet and Tin Plate Company; formerly called the Sharon Works.)—See page 72; also pages 75-76.

Struthers Works, Struthers, Ohio. Built in 1881-2 and entirely rebuilt in 1895; partly destroyed by fire on August 12, 1899, but immediately rebuilt; 6 pair and 6 sheet furnaces, 2 single and 5 double annealing furnaces, 6 hot sheet mills, (one 26 x 40, three 26 x 38, and two 24 x 34-inch,) and 4 cold mills (one 24 x 48 and three 22 x 44-inch); product, high-grade pickled and finished steel sheets; annual capacity, 18,800 tons. Fuel, coal.

United States Works, Demmler, (Eighth ward, McKeesport,) Pa. Built in 1873-4; burned and rebuilt in 1883; 11 sheet, 11 pair, and 7 annealing furnaces, 3 hot sheet and 8 hot tin mills, (two 26 x 36, one 26 x 29, one 25 x 45, and seven 26 x 32-inch,) and 12 stands of cold mills (one 22 x 24, three 21 x 37, two 22 x 38, and six 22 x 31-inch); product, Bessemer and open-hearth steel sheets and black plates for tinning; annual capacity, 7,280 tons of sheets and 19,750 tons of black plates. Fuel, bituminous coal. Make tin and terne plates. A galvanizing plant is connected with the works.

Vandergrift Works, Vandergrift, Pa. Built in 1895-6 and put in partial operation in October, 1895; 13 pair and 13 sheet furnaces,

16 combination sheet and pair furnaces, 18 double annealing furnaces, ten 30-gross-ton acid open-hearth steel furnaces, four 4-hole soaking pits, one $26\frac{1}{2} \times 34$ -inch blooming mill with one stand of 2-high rolls, one 2-high 16-inch bar mill, 37 hot sheet mills, (one 26×56 , two 26×53 , three 26×52 , twelve 26×44 , and nineteen 26×40 -inch,) 14 cold mills, (two 26×56 , one 24×56 , one 24×48 , two $24\frac{1}{2} \times 47$, one $24\frac{1}{2} \times 44$, one $24\frac{1}{2} \times 42$, three 26×44 , two 26×40 , and one 24×38 -inch,) and 20 galvanizing pots; first open-hearth steel made January 11, 1897; product, acid open-hearth steel ingots, sheet bars, and black and galvanized sheets; annual capacity, 225,000 tons of ingots, 183,000 tons of sheet bars, 134,100 tons of black sheets, and 154,000 tons of galvanized sheets. Fuel, natural gas, coal, and producer gas. Brand, "Apollo." A galvanizing plant is connected with the works; also a plant for the manufacture of sulphuric acid, with an annual capacity of 10,000 net tons.

Wellsville Works, Wellsville, Ohio. Original mill built in 1873 to make tinplates; remodeled in 1880; 10 pair and 10 sheet furnaces, 26 single and 2 double annealing furnaces, one pile furnace, 10 hot sheet mills, (one 26×50 , one 26×44 , five 26×40 , two 24×34 , and one 26×34 -inch,) and 16 cold mills (four 24×48 , eleven 24×38 , and one 24×50 -inch); product, light plate and sheet iron and highly finished sheet steel; annual capacity, 38,700 tons of light plates and sheets. Fuel, natural gas.

Wood's Works, McKeesport, Pa. Built in 1851; 16 forge fires, 2 refining fires, 24 annealing furnaces, 12 pair furnaces, 10 double sheet furnaces, 4 bar heating furnaces, 3 slab furnaces, 2 softening furnaces, two 20-inch bar mills, 13 hot mills, (one 3-high 24×56 -inch plate, and ten 21×40 and two 24×48 -inch sheet,) 4 cold mills, (two 20×40 and two 24×40 -inch,) and 8 hammers, (one 3,000, one 4,500, and six 3,800-pound.) Open-hearth steel department, built in 1889-90, contains two 15-gross-ton acid furnaces, both of which are idle. Product, light plates and sheet iron and sheet steel, both black and planished; specialty, patent planished sheet iron; annual capacity, 22,000 tons of steel ingots, 30,000 tons of sheet bars, and 47,750 tons of sheets. Fuel, natural gas, manufactured gas, and coal. Charcoal refinery fires for the manufacture of blooms are connected with the works; 16 forge fires; annual capacity, 10,000 tons of hammered blooms.

Trade mark, a Russian bear in the talons of an American eagle. Total annual capacity of the 37 rolling mills and steel works: 247,000 gross tons of open-hearth ingots, 228,000 tons of large and small sheet bars, 10,000 tons of hammered blooms, 691,730 tons of black sheets and plates, 605,800 tons of black plates or sheets for

tinning, stamping, etc., 325,480 tons of galvanized sheets, including building plant, and 10,000 net tons of sulphuric acid.

TINPLATE AND TERNE PLATE WORKS—18.

Capacities are given on double turn and in boxes of 100 pounds.

American Works, Elwood, Indiana. Built in 1891-2 and first tin and terne plates made in July, 1892; 58 sets; weekly capacity, 30,000 base boxes of tin and terne plates. Fuel, coal and a limited quantity of natural gas. Make black plates.

Anderson Works, Anderson, Indiana. Built in 1894-5 and first tin and terne plates made in August, 1895; 12 sets; weekly capacity, 7,000 base boxes of tinplates. Fuel, coal and a limited quantity of natural gas. Do not now make terne plates. Make black plates.

Chester Works, Chester, W. Va. Tinning plant added to a rolling mill in 1901; first tin and terne plates made in May, 1902; 18 sets, 17 for tinplates and one for terne plates; weekly capacity, 5,000 boxes of tinplates and 700 boxes of terne plates. Fuel, coal. Make black plates.

Crescent Works, Cleveland. Built in 1894-5 and first tin and terne plates made in January, 1896; 11 sets for tinplates; weekly capacity, 5,400 boxes. Fuel, coal. Do not now make terne plates. Make black plates.

Falcon Works, Niles, Ohio. Tinning plant added to rolling mill in 1895 and first tin and terne plates made in March, 1895; 12 sets for tin and terne plates; weekly capacity, 7,000 boxes. Fuel, bituminous coal. Make black plates.—*Idle; closed indefinitely.*

Humbert Works, South Connellsville, Pa. Built in 1896 and first tinplates made December 4, 1896; 12 sets for tinplates; weekly capacity, 6,000 boxes. Fuel, natural gas. Make black plates.

La Belle Works, Wheeling, W. Va. Tinning plant added to rolling mill in 1895; first tinplates made in July, 1895, and first terne plates in January, 1896; 14 sets; weekly capacity, 11,000 boxes of tinplates. Fuel, natural gas. Do not now make terne plates. Make black plates.

Laughlin Works, Martins Ferry, Ohio. Tinning plant added to rolling mill in 1895 and enlarged in 1896-7 and 1900; first tin and terne plates made August 29, 1895; 48 sets for tin and terne plates; weekly capacity, 30,000 boxes. Fuel, natural gas. Make black plates.

Monongahela Works, South Fifteenth street, Pittsburgh. Built in 1893; first terne plates made June 1 and first tinplates November 15, 1893; 18 sets, 15 for tin and 3 for terne plates; weekly capacity, 10,000 boxes. Fuel, natural gas and coal. Make black plates.

Morewood Works, Gas City, Indiana. Built in 1893; first terne plates made in June and first tinplates in December, 1893; 12 sets; weekly capacity, 8,000 base boxes of tinplates. Fuel, coal. Do not now make terne plates. Make black plates.

National Works, Monessen, Pa. Built in 1897-8 and first tin and terne plates made in March, 1898; 47 sets for tin and terne plates; weekly capacity, 28,000 boxes. Fuel, coal. Make black plates.

New Castle Works, New Castle, Pa. Built in 1892-3 and first tin and terne plates made in November, 1893; 26 sets for tin and terne plates; weekly capacity, 20,000 boxes. Fuel, bituminous coal. Make black plates.

Pennsylvania Works, New Kensington, Pa. Built in 1895 and first tin and terne plates made in April, 1895; 15 sets for tinplates; weekly capacity, 8,000 boxes. Fuel, coal. Do not now make terne plates. Make black plates.

Pittsburgh Works, New Kensington, Pa. Built in 1891-2 and first terne plates made in February and first tinplates in October, 1892; 14 sets for tinplates; weekly capacity, 7,700 boxes. Fuel, bituminous coal. Do not now make terne plates. Make black plates.

Sabraton Works, Morgantown, W. Va. Partly built by the Rolling Mill Company of America in 1902; practically completed by the Morgantown Tin Plate Company in 1903-4; rebuilt and enlarged by the American Sheet and Tin Plate Company in 1905-6; first tinplates made in April, 1906; 19 sets for tinplates; weekly capacity, 11,000 boxes. Fuel, natural gas. Make black plates. (Formerly owned but never operated by the Morgantown Tin Plate Company.)

Shenango Works, New Castle, Pa. Built in 1897-8 and first tin and terne plates made in July, 1899; 44 sets for tin and terne plates; weekly capacity, 33,000 boxes. Fuel, coal. Make black plates.

South Sharon Works, South Sharon, Pa. Built in 1900-1 and first tinplates made in July, 1901; 30 sets; weekly capacity, 31,000 boxes of tinplates. Fuel, coal. Make black plates. (Owned by the Sharon Tin Plate Company; controlled by the Union Steel Company and the American Sheet and Tin Plate Company; formerly called the Sharon Works.)—See page 73; also pages 75-76.

United States Works, Demmler, (Eighth ward, McKeesport,) Pa. Original works built in 1874; first terne plates made in 1874 and first tinplates in 1876; manufacture stopped in 1878 and resumed in 1890; new tin house built on modern plan in 1898; 16 sets for tin and terne plates; weekly capacity, 7,000 boxes. Fuel, coal. Make black plates.

Total weekly capacity of the 18 tinplate and terne plate works on double turn: 265,800 boxes of 100 pounds.

IRON AND BRASS FOUNDRIES AND METAL LATH WORKS.

Aetna-Standard Works, Bridgeport. Product, Cambridge rigid reversible and Aetna expanded metal laths; annual capacity, 1,500 tons.
 Morewood Works, Gas City, Indiana. One iron and brass foundry; product, castings for mill maintenance; annual capacity, 3,000 tons.
 Roll and Machine Works, Canton, Ohio. Product, chilled rolls, sand rolls, and iron castings; annual capacity, 4,400 net tons of chilled and sand rolls and 1,600 tons of iron castings. (Formerly owned and operated by the Canton Roll and Machine Company.)

GALVANIZING WORKS—5 COMPLETED AND 1 BUILDING.

Aetna-Standard Works, Bridgeport. Number of pots, 7; product, Apollo galvanized sheets and roofing; annual capacity, 51,700 tons.
 Dover Works, Canal Dover, Ohio. Number of pots, 4; product, Apollo galvanized sheets; annual capacity, 28,300 tons.
 Guernsey Works, Cambridge, Ohio. Number of pots, 8; product, Apollo galvanized sheets; annual capacity, 41,800 tons.
 Scottdale Works, Scottdale, Pa. Building; number of pots, 6; product, flat galvanized sheets; annual capacity, 42,000 tons.—
Will probably be ready for operation in January, 1908.
 United States Works, Demmler, (Eighth ward, McKeesport,) Pa. Number of pots, 4; product, light sheets from No. 28 to No. 32 gauge; annual capacity, 7,680 tons.
 Vandergrift Works, Vandergrift, Pa. Number of pots, 20; product, Apollo galvanized sheets; annual capacity, 154,000 tons.
 Total annual capacity of the 5 completed works: 283,480 gross tons; of the building works, 42,000 tons: total, 325,480 tons.

COAL LANDS, RAILROADS, SULPHATE OF IRON PLANTS, ETC.

The company owns 2,357 acres of coal lands, located in Armstrong and Westmoreland counties in Pennsylvania and in Tuscarawas and Belmont counties in Ohio. It also owns the Laughlin coal mine, at Martins Ferry, Ohio, which has an annual capacity of 50,000 net tons of bituminous coal. In addition it owns one-third of the capital stock of the National Mining Company, which owns about 8,000 acres of coal lands in Allegheny and Washington counties, Pa. (See page 82.) It also owns extensive natural gas territory and pipe lines in Pennsylvania and Indiana. In addition the company owns the McKeesport Terminal Railroad, at McKeesport, Pa., and the Canal Dover Belt Railway, at Canal Dover, Ohio. It also owns sulphate of iron plants at South Sharon, Pa., and Elwood, Ind.; total annual capacity, 8,500 net tons. Also a plant at Vandergrift, Pa., for the manufacture of sulphuric acid; annual capacity, 10,000 net tons.

AMERICAN BRIDGE COMPANY.

Practically all the stock of the American Bridge Company is owned by
(the United States Steel Corporation.

American Bridge Company; statutory offices, 51 Newark st., Hoboken, N. J.; Pittsburgh offices, Frick Building; New York offices, 42 Broadway. *Officers at Pittsburgh:* August Ziesing, President; Frank B. Thompson, Auditor; William H. Connell, Treasurer; James L. Bernard, Mechanical Engineer; W. G. A. Millar, Purchasing Agent; and Charles S. Belsterling, Traffic Manager. *Officers at New York:* Joshua A. Hatfield, Vice President; Henry Schoonmaker, Secretary; W. deSaussure Trenholm, Assistant Secretary; and C. C. Schneider, Consulting Engineer.

Capital stock, \$70,000,000, of which \$35,000,000 is 7 per cent. cumulative preferred and \$35,000,000 is common. The American Bridge Company operates or controls the following works. Capacities are given in net tons of 2,000 pounds.

ROLLING MILLS AND STEEL WORKS—2.

Ambridge Plant, Ambridge, Pa. Built in 1904-5 and first steel made May 16, 1905; one 15-gross-ton acid open-hearth steel furnace; product, steel castings for the use of the company and for sale; annual capacity, 6,000 tons. Fuel, natural gas. Also builds bridges and steel barges and makes iron castings and forgings. Pencoyd Iron Works, Pencoyd, Pa. Built in 1852; 11 regenerative gas heating furnaces, 3 coal heating furnaces, and 5 trains of rolls, (one 12, two 23, one 28, and one 2-high 36-inch reversing.) Steel department, added in 1887 and since enlarged, contains one 75-gross-ton and ten 30-gross-ton basic open-hearth furnaces; annual capacity, 230,000 net tons of ingots. Product, open-hearth steel channel bars from 2 to 15 inches, beams from 3 to 24 inches, deck beams from 5 to 11½ inches, tees from 1 to 6 inches, angles from 1 to 8 inches, flats from 1 to 14 inches wide, rounds from ½ inch to 7 inches in diameter, and bar and bridge steel, shafting, and steel blooms; annual capacity, 200,000 tons of finished material. Specialties, structural shapes, shafting, and bar and bridge steel. Brand, "Pencoyd." Fuel, bituminous coal. A bridge and construction department (Pencoyd Plant) is connected with the works. Also make iron, brass, and steel castings. (Formerly operated by the A. and P. Roberts Company.)

Total annual capacity of the 2 rolling mills and steel works: 230,-

000 net tons of open-hearth ingots, 6,000 tons of open-hearth castings, and 200,000 tons of finished rolled steel products.

BRIDGEBUILDING WORKS—14.

The following plants build railroad and highway bridges and erect steel buildings and turntables. They also make bolts and rivets. Ambridge Plant, Ambridge, Pa. Annual capacity, from 180,000 to 240,000 tons. Also builds steel barges and makes forged eye-bars and iron and steel castings.

American Plant, Fortieth street and Stewart ave., Chicago. Annual capacity, 24,000 tons. Also makes car and locomotive axles, shafting, and other forgings.

Athens Plant, Athens, Pa. Annual capacity, 15,000 tons. Also makes gray iron castings and forged steel eyebars.

Berlin Plant, East Berlin, Conn. Annual capacity, 18,000 tons.

Canton Plant, Dueber ave. and Bridge st., Canton, Ohio. Annual capacity, 12,000 tons.

Detroit Plant, Beecher ave. and M. C. R. R., Detroit, Michigan. Annual capacity, 20,000 tons.

Edge Moor Plant, Edge Moor, Del. Annual capacity, 30,000 tons.

Lassig Plant, Clybourn and Wrightwood aves., Chicago. Annual capacity, 48,000 tons.

Milwaukee Plant, Seventeenth st. and St. Paul ave., Milwaukee, Wisconsin. Annual capacity, 12,000 tons.

Minneapolis Plant, Seventh ave. and Second st. Southeast, Minneapolis, Minn. Annual capacity, 16,800 tons. Also makes iron castings.

Pencoyd Plant, Pencoyd, Pa. Annual capacity, 90,000 tons. Also builds all kinds of architectural work and standard railroad turntables. (Formerly operated by the A. and P. Roberts Company.)

Shiffler Plant, Forty-eighth street and Allegheny Valley Railway, Pittsburgh. Annual capacity, 24,000 tons.

Toledo Plant, East Broadway and L. S. & M. S. Railway, Toledo, Ohio. Annual capacity, 36,000 tons.

Trenton Plant, foot of Warren st., Trenton, N. J. Annual capacity, 36,000 tons. Also makes chains.

Total annual capacity of the 14 bridgebuilding plants: from 561,800 net tons to 621,800 net tons of iron and steel railroad and highway bridges, steel buildings, turntables, etc.

BOLT AND RIVET WORKS.

All the bridgebuilding plants named above make bolts and rivets.

STEEL BARGE YARD.

Ambridge Plant, Ambridge, Pa. Steel barges, chiefly for river use.

CAR-AXLE AND CHAIN WORKS.

American Plant, Fortieth street and Stewart avenue, Chicago, Illinois. Product, hammered car and locomotive axles; annual capacity, 24,000 tons.

Trenton Plant, foot of Warren street, Trenton, New Jersey. Product, iron cable and other chains for the use of the American Bridge Company and for sale; sizes, up to 1½ inches inclusive.

IRON AND STEEL FORGING WORKS.

Ambridge Plant, Ambridge, Pa. Product, solid forged steel eye-bars from 2 to 16 inches wide for use in the bridgebuilding department of the plant; annual capacity, 18,000 tons.

American Plant, Fortieth street and Stewart avenue, Chicago, Illinois. Product, shafting, axles, and other forgings; annual capacity, not including axles, 1,200 tons.

Athens Plant, Athens, Pa. Product, solid forged steel eyebars from 2 to 10 inches wide for use in the bridgebuilding department of the plant; annual capacity, 3,600 tons.

Total annual capacity of the 3 plants: 22,800 net tons.

IRON, BRASS, AND STEEL FOUNDRIES.

Ambridge Plant, Ambridge, Pa. Product, iron and steel castings; annual capacity, 6,000 tons of iron and 6,000 tons of steel castings.

Athens Plant, Athens, Pa. Product, general iron castings; annual capacity, 600 tons.

Minneapolis Plant, Minneapolis, Minnesota. Product, general iron castings; annual capacity, 2,400 tons.

Pencoyd Plant, Pencoyd, Pa. Product, general iron, brass, and steel castings; annual capacity, 2,700 tons of iron, 100 tons of brass, and 4,000 tons of steel castings. (Formerly operated by the A. and P. Roberts Company.)

Total annual capacity of the foundries: 11,700 net tons of iron castings, 100 tons of brass castings, and 10,000 tons of steel castings.

EMPIRE BRIDGE COMPANY.

Empire Bridge Company; principal offices, Horseheads, Chemung county, N. Y.; New York offices, 42 Broadway; Pittsburgh offices, Frick Building. *Officers:* August Ziesing, President, William H. Connell, Treasurer, Frank B. Thompson, Auditor, W. G. A. Millar, Purchasing Agent, and Charles S. Belsterling, Traffic Manager, Pittsburgh; Henry Schoonmaker, Secretary, New York. The company operates the following works:

BRIDGEBUILDING AND BOLT AND RIVET WORKS—3.

The following plants build railroad and highway bridges, steel buildings, and turntables. They also make bolts and rivets.

Brooklyn Plant, foot of Clay st., Brooklyn, N. Y. Annual capacity, 30,000 tons.

Buffalo Plant, Bailey ave. and L. V. Ry., Buffalo, N. Y. Annual capacity, 7,200 tons.

Elmira Plant, East Miller st., Elmira, N. Y. (This plant includes the North and South shops at Elmira and the Horseheads shops at Horseheads. The North shops at Elmira are being enlarged and by the end of 1907 the three shops will have an annual capacity of 55,000 tons.)

Total annual capacity of the 3 plants, including enlargements, 92,200 net tons of bridges, steel buildings, and turntables.

AMERICAN BRIDGE COMPANY OF NEW YORK.

American Bridge Company of New York; principal offices, No. 42 Broadway, New York; Pittsburgh offices, Frick Building. *Officers:* Joshua A. Hatfield, President, New York; August Ziesing, Vice President, Commercial National Bank Building, Chicago; Frank B. Thompson, Auditor, William H. Connell, Treasurer, W. G. A. Millar, Purchasing Agent, and Charles S. Belsterling, Traffic Manager, Pittsburgh; Henry Schoonmaker, Secretary, New York.

Branch offices in the United States: West End Hotel, Portland, Maine; Fiske Building, 89 State st., Boston; East Berlin, Conn.; Pennsylvania Building, Fifteenth and Chestnut sts., Philadelphia; Continental Trust Building, Baltimore; 209 Kellogg st., Syracuse, N. Y.; Frick Building, Pittsburgh; Ellicott Square Building, Buffalo; Rockefeller Building, Cleveland; Commercial National Bank Building, Chicago; Second st. and Seventh ave. S. E., Minneapolis; Hennen Building, New Orleans; Postal Telegraph Building, Kansas City, Missouri; Equitable Building, Denver; Dooley Block, Salt Lake City; Crocker Building, San Francisco; Alaska Building, Seattle, State of Washington; Candler Building, Atlanta; Union Trust Building, Cincinnati; Seventeenth st. and St. Paul ave., Milwaukee, Wis.; Powers Block, Rochester, N. Y.; Chemical Building, St. Louis, Mo.; and Richmond, Va.

The American Bridge Company of New York contracts for and erects steel railroad bridges, steel highway bridges, steel buildings, viaducts, turntables, etc., but does not manufacture iron or steel. Capital stock, \$100,000.

UNION STEEL COMPANY.

Practically all the stock of the Union Steel Company is owned by the United States Steel Corporation.

Union Steel Company; executive offices, Empire Building, No. 71 Broadway, New York; Auditor's and Treasurer's offices, Carnegie Building, Pittsburgh. *Officers*: W. B. Dickson, President; W. J. Filbert, Secretary; James J. Campbell, Auditor and Assistant Secretary; and W. C. McCausland, Treasurer. Capital stock, \$20,000,000, all common.

On December 1, 1902, the Union Steel Company acquired all the capital stock and all the properties of the Sharon Steel Company and the Sharon Sheet Steel Company.

It also owns all the capital stock of the Donora Mining Company, the River Coal Company, the Republic Coke Company, the Sharon Ore Company, the Sharon Coke Company, the Mercer Valley Railroad Company, the Donora Southern Railroad Company, and the Girard Land Company.

In addition it owns over 59 per cent. of the capital stock of the Sharon Tin Plate Company and two-thirds of the capital stock of the Sharon Coal and Limestone Company. It also owns (through the Donora Mining Company) two ore-carrying steamships, with an annual ore-carrying capacity of 228,000 tons.

The Union Steel Company owns or controls the manufacturing plants named below, all of which are operated by subsidiary companies of the United States Steel Corporation:

BLAST FURNACES—5.

Donora Furnaces, Donora, Pa. Operated by the Carnegie Steel Company (of New Jersey). Two stacks, Nos. 1 and 2, each 85 x 22, built in 1902-4; No. 1 blown in January 3, 1905, and No. 2 February 7, 1905; eight Kennedy stoves, each 100 x 24; fuel, Connellsville coke; ore, Lake Superior; product, basic open-hearth pig iron; total annual capacity, 300,000 tons. Equipped with 2 Heyl & Patterson pig-iron casting machines. (Built and owned by the Union Steel Company.)—*Both active in 1907. See page 7.*

South Sharon Furnaces, South Sharon, Pa. Operated by the Carnegie Steel Company (of New Jersey). Three stacks: No. 1, one stack, 100 x 22, built in 1900-1 and blown in December 8, 1901; No. 2 and No. 3, two stacks, each 79 x 20, built in 1902-4; No. 2 blown in September 9, 1904, and No. 3 November 27, 1904;

No. 1 has four Cowper-Kennedy stoves, each 111 x 22; and Nos. 2 and 3 have each four Cowper-Kennedy stoves, each 90 x 22. Fuel, coke; ore, Lake Superior; product, basic pig iron; total annual capacity, 450,000 tons. Equipped with 2 double-strand Heyl & Patterson pig-iron casting machines. Molten metal from these furnaces is used in the open-hearth department of the South Sharon Steel Works. (Built by the Sharon Steel Company.)—

All active in 1907. See page 10.

Total annual capacity of the 5 furnaces: 750,000 gross tons.

ROLLING MILLS AND STEEL WORKS—6.

Donora Steel Works, Donora, Pa. Operated by the Carnegie Steel Company (of New Jersey). Built in 1902-3; twelve 50-gross-ton Siemens basic open-hearth steel furnaces with an annual capacity of 500,000 tons of ingots, four 4-hole soaking pits, and one 40-inch blooming mill; first steel made February 7, 1905, and first products rolled March 2, 1905; product, billets, blooms, and slabs; also forging blooms and forging billets; annual capacity, 450,000 gross tons of blooms. Fuel, natural gas. Adding one 3-high 30-inch billet mill, for the manufacture of 4 x 4-inch billets, and 4 soaking pits; estimated annual capacity, 400,000 tons; this mill will probably be ready for operation in August, 1907.—*See pages 11-12.*

Donora Works, Donora, Pa. Operated by the American Steel and Wire Company of New Jersey. Built in 1900-1 and first put in operation in September, 1901; 5 heating furnaces, one continuous roughing and one right and one left hand Garrett finishing rod mill with 6 trains of rolls, (one 16-inch continuous roughing and two 10 and three 12-inch finishing,) 332 wire-drawing blocks, and 290 wire-nail machines; product, steel wire rods, plain, galvanized, and varnished wire, barbed and woven fence, staples, wire nails, and sulphate of iron; annual capacity, 200,000 tons of wire rods, 160,000 tons of wire, and 1,635,000 kegs of wire nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works.—*See page 44.*

Mercer Works, South Sharon, Pa. Operated by the American Sheet and Tin Plate Company. Built in 1901-3 and rebuilt in 1904-5; first put in operation in August, 1905; 4 double pair and 5 double sheet furnaces, 3 annealing furnaces, 14 hot sheet mills, (nine 28 x 40-inch roughing and five 28 x 38-inch finishing,) and four 22 x 48-inch cold mills; product, black sheets; annual capacity, 38,400 tons. Fuel, coal and producer gas. (Formerly called the South Sharon Sheet Mill; later the Sharon Works.)—*See page 59.*

South Sharon Steel Works, South Sharon, Pa. Operated by the Carnegie Steel Company (of New Jersey). Built in 1900-1; twelve 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 480,000 tons of ingots; first steel made April 30, 1901; one 250-ton metal mixer, three 4-hole soaking pits, one 36-inch blooming mill, and one 48-inch universal mill; product, blooms, billets, skelp, and universal plates; also forging blooms and forging billets; annual capacity, 300,000 tons of blooms and billets and 120,000 tons of universal plates and skelp. Fuel, producer gas. Molten metal is taken from the South Sharon Furnaces to the metal mixer and thence conveyed to the open-hearth furnaces in ladles. (Formerly called the South Sharon Works.)—*See page 16.*

South Sharon Works, South Sharon, Pa. Operated by the American Steel and Wire Company of New Jersey. Built in 1900-1 and first put in operation in May, 1901; first wire rods rolled in August, 1901; 4 continuous heating furnaces, 2 reheating furnaces, one continuous billet mill, 2 continuous rod mills, one tinplate bar mill, 180 wire-drawing blocks, and 251 wire-nail machines; product, tinplate bars, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 80,000 gross tons of tinplate bars, 110,000 tons of wire rods, 88,000 tons of wire, and 1,010,000 kegs of wire nails. Fuel, producer gas and coal. A galvanizing plant is connected with the works. (Formerly called the Sharon Works.)—*See pages 45-46.*

South Sharon Works, South Sharon, Pa. Operated by the American Sheet and Tin Plate Company. Built in 1900-1 and first put in operation May 16, 1901; 20 sheet and pair furnaces, 6 double annealing furnaces, twenty 26 x 32-inch hot tin mills, and 21 sets of 22 x 40-inch cold mills; product, black plates for tinning; annual capacity, 50,500 tons. Fuel, manufactured gas and coal. Make tinplates. A plant for the manufacture of sulphate of iron is connected with the works. (Owned by the Sharon Tin Plate Company; controlled by the Union Steel Company and the American Sheet and Tin Plate Company; formerly called the Sharon Works.)—*See page 61; also pages 75-76.*

Total annual capacity of the 6 works, including additions now being made: 980,000 gross tons of open-hearth steel ingots, 1,150,000 tons of blooms, billets, and slabs, including forging blooms and forging billets, 80,000 tons of tinplate bars, 50,500 tons of black plates for tinning, 38,400 tons of black sheets, 120,000 tons of universal plates and skelp, 310,000 tons of wire rods, 248,000 tons of wire, and 2,645,000 kegs of wire nails.

TINPLATE WORKS.

South Sharon Works, South Sharon, Pa. Operated by the American Sheet and Tin Plate Company. Built in 1900-1 and first tinplates made in July, 1901; 30 sets; weekly capacity, 31,000 boxes of tinplates. Fuel, coal. Make black plates. (Owned by the Sharon Tin Plate Company; controlled by the Union Steel Company and the American Sheet and Tin Plate Company; formerly called the Sharon Works.)—*See page 64; also pages 75-76.*

WIRE-ROD, WIRE, AND WIRE-NAIL WORKS.

Donora Works, Donora, Pa. Operated by the American Steel and Wire Company of New Jersey. Product, steel wire rods, plain, galvanized, and varnished wire, barbed and woven fence, staples, wire nails, and sulphate of iron; annual capacity, 200,000 tons of rods, 160,000 tons of wire, and 1,635,000 kegs of nails. Wire department: number of wire-drawing blocks, 332; sizes of wire drawn, from No. 00 to No. 20 gauge. Wire-nail department: number of machines, 290; standard sizes. A galvanizing plant is connected with the works.—*See page 48.*

South Sharon Works, South Sharon, Pa. Operated by the American Steel and Wire Company of New Jersey. Product, steel wire rods, plain and galvanized wire, barbed and woven fence, staples, and wire nails; annual capacity, 110,000 tons of rods, 88,000 tons of wire, and 1,010,000 kegs of nails. Wire department: number of wire-drawing blocks, 180; sizes, from $\frac{1}{8}$ of an inch to No. 22 gauge. Wire-nail department: number of machines, 251; standard sizes. A galvanizing plant is connected with the works. (Formerly called the Sharon Works.)—*See pages 49-50.*

Total annual capacity of the 2 works: 310,000 gross tons of wire rods, 248,000 tons of wire, and 2,645,000 kegs of wire nails.

GALVANIZING WORKS.

Donora Works, Donora, Pa. Operated by the American Steel and Wire Company of New Jersey. Number of galvanizing pans, 6; number of revolving nail galvanizing furnaces, 2; annual capacity, 85,000 tons of galvanized fence wire and 1,500 tons of galvanized nails.—*See page 52.*

South Sharon Works, South Sharon, Pa. Operated by the American Steel and Wire Company of New Jersey. Number of galvanizing pans, 3; product, fence wire; annual capacity, 48,000 tons. (Formerly called the Sharon Works.)—*See page 52.*

Total annual capacity of the 2 works: 133,000 tons of galvanized wire and 1,500 tons of galvanized nails.

SULPHATE OF IRON PLANTS.

Donora Works, Donora, Pa. Operated by the American Steel and Wire Company of New Jersey. Product, sulphate of iron; annual capacity, 4,500 tons.—*See page 53.*

South Sharon Works, South Sharon, Pa. Operated by the American Sheet and Tin Plate Company. Product, sulphate of iron; annual capacity, 6,000 tons.—*See page 65.*

Total annual capacity: 10,500 tons of sulphate of iron.

SHARON STEEL COMPANY AND SHARON SHEET STEEL COMPANY.

The Sharon Steel Company and the Sharon Sheet Steel Company are no longer operating companies, their properties having been transferred to the Union Steel Company on December 1, 1902.

SHARON ORE COMPANY.

This company owns the Sharon iron-ore mine in the Mesabi Range. All its capital stock is owned by the Union Steel Company. For further information concerning it see page 86.

DONORA MINING COMPANY.

This company owns several iron-ore mines in the Mesabi Range. Its capital stock is all owned by the Union Steel Company. For further information concerning it see page 86.

RIVER COAL COMPANY.

This company owns 1,500 acres of coal lands in Fayette county, Pa. Its annual coal shipments amount to from 500,000 tons to 600,000 tons. All its capital stock is owned by the Union Steel Company. For further information concerning it see page 82.

SHARON COKE COMPANY.

The Sharon Coke Company owns 1,448 acres of coking coal lands at Ronco, Fayette county, Pa., where it has under construction 350 bee-hive coke ovens. It also owns 212 completed Otto-Hoffmann retort coke ovens at South Sharon, Pa. Its capital stock is all owned by the Union Steel Company. The coal mines are and the bee-hive coke ovens will be operated by the H. C. Frick Coke Company. The by-product coke ovens are operated by the Carnegie Steel Company (of New Jersey). For further information concerning the Sharon Coke Company see page 83.

REPUBLIC COKE COMPANY.

This company owns 3,218 acres of undeveloped coal lands and 511 acres of surface lands in Fayette county, Pa. Its capital stock is all owned by the Union Steel Company. For further information concerning the Republic Coke Company see page 83.

SHARON COAL AND LIMESTONE COMPANY.

The Sharon Coal and Limestone Company has under lease 5,969 acres of coal and limestone property in Butler, Mercer, and Lawrence counties, Pennsylvania. Two-thirds of its capital stock is owned by the Union Steel Company. For further information concerning the Sharon Coal and Limestone Company see page 82.

MERCER VALLEY RAILROAD COMPANY.

Mercer Valley Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers*: J. H. Reed, President; D. M. Clemson, Vice President; William J. Post, Secretary and Auditor; and G. E. Campbell, General Freight Agent. All the capital stock of this company is owned by the Union Steel Company.

This company operates 33 miles of track at South Sharon, Pa.

DONORA SOUTHERN RAILROAD COMPANY.

Donora Southern Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers*: J. H. Reed, President; D. M. Clemson, Vice President; William J. Post, Secretary and Auditor; and G. E. Campbell, General Freight Agent. All the capital stock of this company is owned by the Union Steel Company. The company operates 4.40 miles of track at Donora, Pa.

GIRARD LAND COMPANY.

Girard Land Company; general offices, Carnegie Building, Pittsburgh. *Officers*: D. M. Clemson, President; L. H. Burnett, Vice President; W. C. McCausland, Treasurer; W. W. Blackburn, Secretary; and James J. Campbell, Assistant Secretary. All the capital stock of this company is owned by the Union Steel Company. This company owns lands and houses at South Sharon, Pa.

SHARON TIN PLATE COMPANY.

Sharon Tin Plate Company; general offices, Frick Building, Pittsburgh. *Officers*: C. W. Bray, President; E. W. Pargny, Vice Presi-

dent; and H. W. Wheeler, Secretary. Over 59 per cent. of the capital stock of this company is owned by the Union Steel Company and the remainder of the capital stock by the American Sheet and Tin Plate Company.

This company owns a black plate mill, a tin dipping plant, and a sulphate of iron plant at South Sharon, Pa., all operated by the American Sheet and Tin Plate Company. For further information concerning these works see pages 61, 64, and 74.

CLAIRTON STEEL COMPANY.

Practically all the stock of the Clairton Steel Company is owned by the United States Steel Corporation.

Clairton Steel Company; general offices, Carnegie Building, Pittsburgh. *Officers:* A. C. Dinkey, President; W. W. Blackburn, Vice President and Secretary; W. C. McCausland, Treasurer; and James J. Campbell, Auditor and Assistant Secretary.

The Clairton Steel Company owns the blast furnaces, rolling mills, and steel works named below, all of which are operated by the Carnegie Steel Company (of New Jersey). The Clairton Steel Company also owns all the capital stock of the St. Clair Terminal Railroad Company and 51 per cent. of the capital stock of the St. Clair Limestone Company.

BLAST FURNACES—3.

Clairton Furnaces, Clairton, Pa. Operated by the Carnegie Steel Company (of New Jersey). Three stacks, each 85 x 21; started by the St. Clair Furnace Company in 1901 and completed by the Clairton Steel Company in 1903; No. 1 blown in April 21, 1903, No. 2 June 14, 1903, and No. 3 December 8, 1904; twelve Massicks & Crooke stoves, each 95 x 21; fuel, coke; ores, Mesabi and old range from Minnesota and Michigan; product, basic pig iron; total annual capacity, 460,000 tons. (Formerly operated by the Clairton Steel Company.)—*All active in 1907. See page 7.*

Total annual capacity of the 3 furnaces: 460,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1.

Clairton Steel Works, Clairton, Pa. Operated by the Carnegie Steel Company (of New Jersey). Built in 1901-2 by the St. Clair Steel Company and the Clairton Steel Company; first put in operation September 8, 1902; twelve 50-gross-ton Siemens open-hearth steel furnaces (one acid and 11 basic); first acid steel

made September 8 and first basic steel September 11, 1902; 20 soaking pits and 4 trains of rolls (one 40-inch blooming, one 28-inch billet, one 22-inch structural, and one 18-inch bar); bar and structural mills added in 1905; first bars rolled July 27, 1905, and first structural shapes November 30, 1905; product, ingots, billets, blooms, slabs, structural shapes, and merchant bars; also forging blooms and forging billets; annual capacity, 35,000 tons of acid and 450,000 tons of basic ingots, 400,000 tons of blooms, billets, and slabs, 90,000 tons of merchant bars, and 100,000 tons of structural shapes. Fuel, natural gas in open-hearth furnaces and soaking pits and bituminous coal under boilers. Work on 2 additional structural mills (one 14 and one 22-inch) was commenced in February, 1907. The 14-inch mill will probably be ready for operation about August 15 and the 22-inch mill about October 1, 1907. (Formerly operated by the Clairton Steel Company.)—*See page 11.*

Total annual capacity of the works: 450,000 gross tons of basic open-hearth steel ingots, 35,000 tons of acid open-hearth steel ingots, 400,000 tons of blooms, billets, and slabs, 100,000 tons of structural shapes, and 90,000 tons of merchant bars.

COAL AND IRON-ORE LANDS.

The Clairton Steel Company owns 2,639 acres of undeveloped coal lands in Fayette county, Pa. It also owns all the capital stock of the Champion Iron Company, which owns the Champion iron-ore mine in the Marquette Range. For further information concerning this company see page 88. The Clairton Steel Company also owns the Day property in Itasca county, Minnesota.

ST. CLAIR TERMINAL RAILROAD COMPANY.

St. Clair Terminal Railroad Company; general offices, Carnegie Building, Pittsburgh. *Officers:* J. H. Reed, President; D. M. Clemson, Vice President; G. W. Kepler, Treasurer; and W. J. Post, Secretary and Auditor. All its capital stock is owned by the Clairton Steel Company. The company owns and operates 6.7 miles of main line and branches and .55 of a mile of sidings at Clairton, Pa. It owns 7 locomotives and 125 freight cars.

ST. CLAIR LIMESTONE COMPANY.

St. Clair Limestone Company; general offices, Carnegie Building, Pittsburgh. *Officers at Pittsburgh:* D. G. Kerr, President; W. W. Blackburn, Secretary; W. C. McCausland, Treasurer; and

James J. Campbell, Auditor and Assistant Secretary. *Officer at Hollidaysburg, Pa.:* J. King McLanahan, General Manager.

The Clairton Steel Company owns 51 per cent. of the stock of the St. Clair Limestone Company, which owns 25 $\frac{1}{2}$ acres of limestone lands in Blair county, Pa., on which are located quarries with an annual capacity of 300,000 tons of limestone.

UNITED STATES STEEL PRODUCTS EXPORT COMPANY.

United States Steel Products Export Company; general offices, Battery Park Building, 21 State st., New York; branch offices, 71-72 King William st., London, E. C., England; Bank of Ottawa Building, Montreal, Canada; Mutual Life Building, 14 Martin Place, Sydney, New South Wales, Australia; Edificio de la Mútua, 401, Mexico City, Mexico; Buenos Ayres, Argentine Republic; Valparaiso, Chili; Shanghai, China; Yokohama, Japan; and Singapore, Straits Settlements. *Officers at New York:* J. A. Farrell, President; Thomas Murray, Secretary; and T. P. Alder, Treasurer. This company does not manufacture finished or unfinished products of any kind, but sells for export the products of the following subsidiary companies of the United States Steel Corporation: Carnegie Steel Company, Illinois Steel Company, Lorain Steel Company, National Tube Company, Shelby Steel Tube Company, American Sheet and Tin Plate Company, American Steel and Wire Company of New Jersey, and American Bridge Company; also the Western Tube Company.

LIST OF PRODUCTS EXPORTED.

The United States Steel Products Export Company exports Bessemer and basic open-hearth steel billets, slabs, sheet and tin-plate bars, and skelp.

Also steel rails, splice bars, bolts, nuts, spikes and other accessories, crossings, frogs, switches, and other special work for steam and electric railways; also copper rail bonds and tubular poles.

Also beams, channels, angles, tees, zeos, and other structural shapes; steel plates for shipbuilding, tanks, boilers, etc.; flange and fire-box steel; black, galvanized, and painted steel sheets, flat and corrugated; range steel; tack plate; locomotive jacket iron; patent planished sheet iron, etc.; and steel hoops and cotton-ties.

Also merchant bars—rounds, squares, flats, ovals, hexagons, and

other bar shapes; special iron and steel for bolts, rivets, shafting, and other purposes; cold-drawn steel shafting and bars—rounds, squares, flats, hexagons, and other shapes—for screw making and other manufacturing purposes; forged axles for locomotives, railway, and tramway cars; and forgings for machinery and special purposes.

Also black and galvanized wrought merchant pipe for gas, water, steam, and other purposes; mild steel and charcoal iron boiler tubes for stationary, locomotive, and marine work; casing, tubing, and drive pipe for oil and artesian wells; gas and oil line pipe; lap-welded and seamless cylinders for compressed air, carbonic acid gas, anhydrous ammonia, etc.; Converse and Matheson lead joint pipe for water and gas mains; seamless tubes, shrapnel, projectiles, and miscellaneous forgings; cast iron and malleable iron fittings for tubes and pipe; and brass and iron valves and cocks.

Also wire rods; drawn steel wire of every description; barb wire; plain, galvanized, and varnished fence wire; woven wire fencing; fence staples; netting and weaving wires; mattress, broom, and bottling wires; galvanized telegraph and telephone wires; copper wires; and electrical wires.

Also wire nails and wire tacks; wire bale-ties; wire hoops; wire rope, cables, and hawsers; wire sash cords and clothes lines; wire rope tramways and cable hoist conveyors; and horse and mule shoes.

Also tinplates—coke, charcoal, and terne; black plates for tinning, stamping, enameling, and other purposes.

Designs and estimates submitted for bridges and steel buildings, erected complete or prepared ready for erection.

H. C. FRICK COKE COMPANY.

Of the capital stock of the H. C. Frick Coke Company seventy-four and four-tenths per cent. is owned by the Carnegie Steel Company (of New Jersey), three and two-tenths per cent. by the Federal Steel Company, ten and two-tenths per cent. by the Illinois Steel Company, one per cent. by the National Tube Company (of New Jersey), and eleven and two-tenths per cent. by the American Steel and Wire Company of New Jersey.

H. C. Frick Coke Company; general offices, Carnegie Building, Pittsburgh; branch offices, Scottdale, Pa. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treas-

urer; C. P. Parker, Auditor; and C. S. Wardley, Assistant Auditor. Capital stock, \$20,000,000, all common.

The H. C. Frick Coke Company operates or controls the following coke plants, all located in Western Pennsylvania:

COKE WORKS—60.

Allegheny County—Youghiogheny Works, 189 ovens; annual capacity, 117,180 net tons.

Fayette County—Adelaide Works, 375 ovens; Bitner, 300; Buffington, 426; Coalbrook, 120; Continental No. 1, 400; Continental No. 2, 326; Continental No. 3, 300; Davidson, 333; Edenborn, 500; Footedale, 400; Foundry, 97; Frick, 105; Henry Clay, 120; Kyle, 306; Lambert, 460; Leckrone, 516; Leisenring No. 1, 500; Leisenring No. 2, 500; Leisenring No. 3, 504; Leith, 308; Lemont, 577; Morgan, 165; Oliphant, 252; Redstone, 446; Shoaf, 448; Sterling, 30; Summit, 32; Tip Top, 121; Trotter, 464; Valley, 251; White, 200; Wynn, 300; Youngstown, 241; and Yorkrun, 500.

Total in Fayette county—34 coke plants; 10,923 ovens; annual capacity, 7,218,410 net tons.

Westmoreland County—Alverton Works, 356 ovens; Baggaley, 397; Brinkerton, 240; Buckeye, 270; Calumet, 260; Central, 303; Crossland, 118; Dorothy, 230; Enterprise, 47; Hecla No. 1, 272; Hecla No. 2, 500; Hecla No. 3, 300; Larimer, 180; Mammoth, 510; Marguerite, 400; Monastery, 150; Mullin, 82; Mutual, 195; Painter, 120; South West No. 1, 625; South West No. 2, 252; South West No. 3, 205; South West No. 4, 151; Standard, 901; and United, 350.

Total in Westmoreland county—25 coke plants; 7,414 ovens; annual capacity, 5,076,830 net tons.

Grand total—60 coke plants; 18,526 ovens; annual capacity, 12,412,420 net tons.

In addition the H. C. Frick Coke Company is building 400 ovens at Phillips, north of Uniontown, Fayette county, on the Monongahela Railroad, with an annual capacity of 268,000 tons; 250 ovens at Dearth, Fayette county, on the Low Phos branch of the Monongahela Railroad, with an annual capacity of 167,500 tons; and 400 ovens at Collier, Fayette county, on the Yorkrun branch of the Baltimore and Ohio Railroad, with an annual capacity of 268,000 tons: total, 1,050 ovens; total annual capacity, 703,500 net tons.

The H. C. Frick Coke Company also owns 125 coke ovens at its Larimer Works, at Larimer, Pa., which have been idle for many years.

COAL AND OTHER LANDS, CARS, REPAIR SHOPS, ETC.

The H. C. Frick Coke Company owns or controls about 57,000 acres of coal lands, 18,000 acres of surface lands, and 2,065 railroad cars. It operates the Hopwood coal mines, at Leith Station, and the Gates mines, at Adah, each in Fayette county, Pa., and the Chambers mines, at Pleasant Unity, Westmoreland county, Pa., which produce coal for sale.

The company also operates at Everson, Fayette county, Pa., extensive repair shops which are equipped for repairing and rebuilding gondola, box, mine, and other cars, locomotives, etc.

THE YOUGHIOGHENY NORTHERN RAILWAY COMPANY.

The Youghioghenny Northern Railway Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treasurer; C. P. Parker, Auditor; and C. S. Wardley, Assistant Auditor. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The line of the Youghioghenny Northern Railway Company extends from Broad Ford to Summit, Fayette county, Pa., 2 miles and 22.3 feet. The line is leased and operated by the Pittsburgh, McKeesport, and Youghioghenny Railway Company.

TROTTER WATER COMPANY.

Trotter Water Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treasurer; C. P. Parker, Auditor; and C. S. Wardley, Assistant Auditor. The capital stock of this company is owned by the Carnegie Steel Company (of New Jersey) and the H. C. Frick Coke Company. The Youghioghenny Water Company was merged with the Trotter Water Company on September 14, 1905.

The works of this company are located as follows: Trotter Plant, on the Youghioghenny river, $1\frac{1}{2}$ miles above Connellsville, Pa.; Yough Plant, at Broad Ford, Pa.; and Huron Plant, on the Monongahela river, near Masontown, Pa. They supply water to coke works, railroads, manufacturing establishments, and for public consumption generally in Dunbar, North Union, Franklin, Upper Tyrone, Connellsville, Georges, South Union, and German townships, and in Fairchance borough, Fayette county, Pa. The pumping capacity is 11,500,000 gallons daily.

MOUNT PLEASANT WATER COMPANY.

Mount Pleasant Water Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treasurer; C. P. Parker, Auditor; and C. S. Wardley, Assistant Auditor. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The works of this company are located at Bridgeport, Fayette county, Pa. The pumping capacity is 4,000,000 gallons per day and the reservoir capacity is 220,000,000 gallons. Water is supplied to the borough of Mount Pleasant, in Westmoreland county, and to coke works, railroads, and manufacturing establishments in East Huntington, Mount Pleasant, and Hempfield townships.

NATIONAL MINING COMPANY.

National Mining Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; J. L. Lowther, Secretary and Treasurer. Two-thirds of the stock of this company is owned by the Carnegie Steel Company (of New Jersey) and one-third by the American Sheet and Tin Plate Company.

The National Mining Company owns about 8,000 acres of coal lands in Allegheny and Washington counties, Pa., and mines annually about 800,000 tons of coal for heating and steam purposes.

RIVER COAL COMPANY.

River Coal Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Vice President; and J. L. Lowther, Secretary and Treasurer. All the stock of this company is owned by the Union Steel Company. The company owns 1,500 acres of coal lands in Fayette county, Pa. Its annual shipments amount to from 500,000 to 600,000 tons.

SHARON COAL AND LIMESTONE COMPANY.

Sharon Coal and Limestone Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; P. Keller, Treasurer; C. P. Parker, Auditor; and C. F. Miller, Assistant Auditor. Two-thirds of the capital stock of this company is owned by the Union Steel Company. The Sharon Coal and Limestone Company has under lease 5,969 acres of coal and limestone property in Butler, Mercer, and Lawrence counties in Pennsylvania.

SHARON COKE COMPANY.

Sharon Coke Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Vice President and Secretary; P. Keller, Treasurer; C. P. Parker, Auditor; and C. F. Miller, Assistant Auditor. All the capital stock of this company is owned by the Union Steel Company.

The Sharon Coke Company owns 1,448 acres of coking coal lands at Ronco, Fayette county, Pa., at which there are now under construction 350 bee-hive coke ovens, which will have an annual capacity of 234,500 net tons of coke. The company also owns 212 completed Otto-Hoffmann retort coke ovens at South Sharon, Pa. These ovens have a daily capacity of about 1,200 tons of by-product coke. The coal mines are and the bee-hive ovens will be operated by the H. C. Frick Coke Company. The by-product ovens are operated by the Carnegie Steel Company (of New Jersey).

REPUBLIC COKE COMPANY.

Republic Coke Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treasurer; C. P. Parker, Auditor; and C. F. Miller, Assistant Auditor. All the capital stock of this company is owned by the Union Steel Company.

The Republic Coke Company owns 3,218 acres of undeveloped coal lands and 511 acres of surface lands in Fayette county, Pa.

MINGO COAL COMPANY.

Mingo Coal Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; W. W. Blackburn, Secretary; and W. C. McCausland, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey). The Mingo Coal Company owns 13,093 acres of undeveloped coal lands and 15 acres of surface lands in Washington county, Pa.

UNITED STATES COAL AND COKE COMPANY.

United States Coal and Coke Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; J. D. McCreery, Secretary and Treasurer; C. P. Parker, Auditor; C. F. Miller, Assistant Auditor; and E. O'Toole, General Superintendent. All its capital stock is owned by the Illinois Steel Company. The company leases 50,000 acres of coal lands in McDowell county, W. Va., on which it has 2,151 completed bee-hive coke ovens, with an annual capacity of 1,200,000 net tons of coke.

CONNELLSVILLE AND MONONGAHELA RAILWAY COMPANY.

Connellsville and Monongahela Railway Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; J. D. McCreery, Secretary and Treasurer; C. P. Parker, Auditor; and C. F. Miller, Assistant Auditor. The capital stock of this company is owned by the Federal Steel Company.

The Connellsville and Monongahela Railway Company was formed on March 11, 1905, by the merger of the Masontown and New Salem Railroad Company and the Connellsville Central Railroad Company. Its line extends from Moser Run Junction, Pa., to Brownsville, Pa., a distance of about 15.66 miles, and is operated under lease by the Pennsylvania Railroad Company.

OLIVER IRON MINING COMPANY.

All the stock of the Oliver Iron Mining Company is owned by the Carnegie Steel Company (of New Jersey).

Oliver Iron Mining Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. Capital stock, \$1,200,000.

This company holds in fee or by lease various iron-ore properties in the Vermilion, Mesabi, Gogebic, Marquette, and Menominee Ranges in the Lake Superior region. The Marquette Range is wholly in Michigan, the Menominee and Gogebic Ranges are partly in Michigan and partly in Wisconsin, and the Vermilion and Mesabi Ranges are in Minnesota. It also owns the capital stock of sundry mining companies which own various tracts of mineral and timber lands in the Lake Superior region. In addition it owns 75 per cent. of the stock of the Lake Superior Iron Company and 75 per cent. of the stock of the Regent Iron Company. The Oliver Iron Mining Company operates under agreement the active mining properties of the Minnesota Iron Company, the American Mining Company, the Lake Superior Consolidated Iron Mines, the Chapin Mining Company, the Winthrop Iron Company, the Sharon Ore Company, the Donora Mining Company, the

Champion Iron Company, and the Cundy Iron Company. Descriptions of the properties of these companies are given below.

MINNESOTA IRON COMPANY.

Minnesota Iron Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. Capital stock, \$16,500,000, all common, and all owned by the Federal Steel Company.

The Minnesota Iron Company holds in fee or by lease various ore properties and mineral lands in the Mesabi and Vermilion Ranges in Minnesota. It also owns the capital stock of various mining companies which own or hold under lease extensive tracts of mineral lands. In addition it owns 51.45 per cent. of the capital stock of the Chandler Iron Company, which owns the Chandler mine in the Vermilion Range.

It also owns the entire capital stock of the Duluth and Iron Range Railroad Company, which has 161.06 miles of main line, 62.87 miles of branches and spurs, .80 of a mile operated under trackage rights, 73.74 miles of second track, and 133.17 miles of sidings. Its road is equipped with 87 locomotives, 19 passenger cars, and 4,873 box, ore, coal, log, and other freight cars.

CHAPIN MINING COMPANY.

Chapin Mining Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey). This company owns the Chapin iron-ore mine in the Menominee Range.

WINTHROP IRON COMPANY.

Winthrop Iron Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:*

Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey). This company owns the Winthrop iron-ore mine in the Marquette Range.

SHARON ORE COMPANY.

Sharon Ore Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. All the capital stock of this company is owned by the Union Steel Company. This company owns the Sharon iron-ore mine in the Mesabi Range.

DONORA MINING COMPANY.

Donora Mining Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. All the capital stock of this company is owned by the Union Steel Company. This company owns the Penobscot, the Sweeney, and the Doñora iron-ore mines, all of which are located in the Mesabi Range.

LAKE SUPERIOR CONSOLIDATED IRON MINES.

Lake Superior Consolidated Iron Mines; general offices, 765 Broad st., Newark, N. J.; branch offices, Wolvin Building, Duluth, and Empire Building, New York. *Officers at New York:* James Gayley, President; Thomas Murray, Vice President; C. D. Fraser, Secretary and Assistant Treasurer; and Charles E. Scheide, Treasurer. *Officers at Duluth:* George D. Swift, Assistant Secretary and Assistant Treasurer, and John L. Mullin, Auditor. Capital stock, \$29,887,448.97, all common, and practically all owned by the United States Steel Corporation.

IRON-ORE MINES.

The iron-ore properties of the Lake Superior Consolidated Iron Mines are all located in the Mesabi Range in Minnesota. The company owns a considerable acreage of mineral lands in fee and under lease. Its active mines are as follows: Burt, Duluth, Glen, Hull, Hull-Rust Pit, part of the Morris, Pillsbury, Rust, and Sellers.

The company also owns the capital stock of various mining companies, which in turn own in fee or under lease extensive tracts of mineral lands in the Mesabi Range. It also owns the fee of the Biwabik mine, the mine being leased to the Biwabik Mining Company.

RAILROADS.

The Lake Superior Consolidated Iron Mines own the entire capital stock of the Duluth, Missabe, and Northern Railway Company, which operates 192.54 miles of main line, 49.79 miles of branches and spurs, 75.98 miles of second track, and 110.90 miles of sidings. Its road is equipped with 72 locomotives, 25 passenger cars, and 5,494 box, flat, ore, and other freight cars.

AMERICAN MINING COMPANY.

American Mining Company; general offices, Western Reserve Building, Cleveland; branch offices, Commercial National Bank Building, Chicago. *Officers at Cleveland:* Wm. P. Palmer, President, and C. A. Vogt, Auditor. *Officers at Chicago:* J. S. Keefe, Vice President; A. F. Allen, Secretary and Assistant Treasurer; and F. L. Watson, Treasurer. All the capital stock of the American Mining Company is owned by the American Steel and Wire Company of New Jersey.

This company owns the Chisholm, Clark, Sauntry, and Alpena mines in the Mesabi Range, Atlantic in the Gogebic Range, Moore and Stegmiller in the Marquette Range, and Cuff and Hill Top in the Menominee Range of the Lake Superior iron-ore region.

CUNDY IRON COMPANY.

Cundy Iron Company; general offices, Commercial National Bank Building, Chicago. *Officers:* E. J. Buffington, President, and T. J. Hyman, Secretary and Treasurer. All the stock of this company is owned by the Illinois Steel Company.

The Cundy Iron Company owns the Cundy iron-ore mine in the Menominee Range.

CHANDLER IRON COMPANY.

Chandler Iron Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. The Minnesota Iron Company owns 51.45 per cent. of the capital stock of this company.

This company owns and operates the Chandler iron-ore mine in the Vermilion Range.

THE CHAMPION IRON COMPANY.

The Champion Iron Company; general offices, Wolvin Building, Duluth; branch offices, Empire Building, New York. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, Vice President; P. Mitchell, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; and John L. Mullin, Auditor. *Officers at New York:* C. D. Fraser, Secretary and Assistant Treasurer, and Charles E. Scheide, Treasurer. All the capital stock of this company is owned by the Clairton Steel Company.

This company owns the Champion iron-ore mine in the Marquette Range.

GREAT WESTERN MINING COMPANY.

Great Western Mining Company; general offices, Duluth. Capital stock, \$6,000,000, all common.

This company is to take the lease on a royalty basis of the so-called Great Northern Railway iron-ore properties, comprising the properties owned in fee by or under lease to the Great Northern Railway Company, the Northern Pacific Railway Company, and others. The performance of the obligations assumed by the Great Western Mining Company is to be guaranteed by the United States Steel Corporation. Under the lease the royalty to be paid for the iron ore is \$1.65 per gross ton for ore containing 59 per cent. of metallic iron, delivered in docks at the head of Lake Superior. If the ore contains more or less than 59 per cent. of metallic iron the royalty will be increased or decreased according to a fixed scale. The royalty of \$1.65 per ton is to be paid for all ore shipped in 1907. The base price is to increase at the rate of $3\frac{1}{2}$ cents per ton in each succeeding year. The minimum quantity of iron ore to be mined and shipped is 750,000 tons in 1907. In each succeeding year the ore to be mined and shipped is to increase

at the rate of 750,000 tons per year until the quantity mined and shipped in a single year reaches 8,250,000 tons; thereafter the annual minimum quantity to be mined and shipped is to continue on that basis. The ore is to be mined by the lessee. The lease is to continue in force until the iron ore is exhausted, unless on January 1, 1915, it is terminated under the option reserved by the lessee.

LAKE SUPERIOR IRON-ORE MINES.

The iron-ore mines named below are owned or controlled by the constituent companies of the United States Steel Corporation. They are classified according to ranges. In addition to the mines named the subsidiary companies of the United States Steel Corporation own a considerable acreage of mineral lands located in Michigan and Minnesota.

MESABI RANGE IN MINNESOTA.

Active Mines—Adams, Biwabik, ($\frac{1}{4}$ interest,) Burt, Chisholm, Clark, Cloquet, Duluth, Fayal, Genoa, Glen, Higgins No. 2, Hull, Hull-Rust Pit, Mahoning, ($\frac{1}{4}$ interest,) Monroe Tener, Morris, Mountain Iron, Myers, Pillsbury, Rust, Security Fee Fayal, Sellers, Spruce, Union, ($\frac{1}{4}$ interest,) Virginia, and Winifred.

Idle Mines—Auburn Fee, Canisteo, Day, Donora, Hartley, Holman, Penobscot, St. Clair, Sauntry, Sharon, Stephens, and Sweeney.

VERMILION RANGE IN MINNESOTA.

Active Mines—Chandler, (51.45 per cent. interest,) Pioneer, Savoy, Sibley, Soudan, and Zenith.

GOGEBIC RANGE IN MICHIGAN AND WISCONSIN.

Active Mines—Atlantic, Aurora, Norrie, and Tilden. *Idle*—Chicago.

MENOMINEE RANGE IN MICHIGAN AND WISCONSIN.

Active Mines—Aragon, Chapin, Mansfield, Michigan, Pewabik, ($\frac{1}{4}$ interest,) and Riverton. *Idle Mines*—Cuff, Cundy, and Hill Top.

MARQUETTE RANGE IN MICHIGAN.

Active Mines—Champion, Hartford, Lake Superior Hard, ($\frac{1}{4}$ interest,) Lake Superior Soft, ($\frac{1}{4}$ interest,) and Queen, ($\frac{1}{4}$ interest.)

Idle Mines—Moore, Stegmiller, and Winthrop.

IRON RIDGE DISTRICT IN WISCONSIN.

Active Mines—Iron Ridge.

PITTSBURGH STEAMSHIP COMPANY.

Five-sixths of the stock of the Pittsburgh Steamship Company is owned by the Carnegie Steel Company (of New Jersey) and one-sixth by the United States Steel Corporation. Into the Pittsburgh Steamship Company have been merged all the steamship companies belonging to the constituent companies of the United States Steel Corporation, and it now operates all the steamships and barges belonging to the constituent companies of the United States Steel Corporation.

Pittsburgh Steamship Company; general offices, Wolvin Building, Duluth; branch offices, Rockefeller Building, Cleveland, and Empire Building, New York. *Officers at Cleveland:* H. Coulby, President and General Manager; A. F. Harvey, Assistant General Manager; and James H. Hoyt, Secretary. *Officers at Duluth:* J. H. McLean, Vice President; George D. Swift, Assistant Treasurer; and John L. Mullin, Auditor. *Officer at New York:* Charles E. Scheide, Treasurer. Capital stock, \$1,330,000, all common.

The Pittsburgh Steamship Company owns or operates the following steamships and barges on the Great Lakes:

STEAMSHIPS AND BARGES—72 STEAMSHIPS AND 29 BARGES.

Steamships—Bessemer, Black, Bunsen, Briton, Coralia, Corey, Cornell, Crescent City, Corona, Corsica, Cort, Cambria, Colgate, Eads, Edenborn, Ellwood, Empire City, Ericsson, Fairbairn, Frick, Fulton, Gary, Gates, German, Gilbert, Griffin, Harvard, Hill, Houghton, Joliet, Linn, LaSalle, Mataafa, Maricopa, Maunaloa, Malietoa, McDougall, Morgan, Morse, Manola, Mariska, Maruba, Matoa, Marina, Masaba, Maritana, Mariposa, Mather, Neilson, Perkins, Poe, Princeton, Palmer, Queen City, Ream, Rensselaer, Rockefeller, Rogers, Roman, Siemens, Stephenson, Superior City, Saxon, Trevor, Van Hise, Watt, Widener, Wolvin, Wawatam, and Zenith City.

Barges—Bryn Mawr, Bell, Carrington, Corliss, Fritz, Holley, Jenney, Krupp, Maia, Manila, Marsala, Malta, Marcia, Manda, Martha, Magna, Maida, Nasmyth, Roebing, Smeaton, Thomas, 117, 118, 130, 131, 132, 133, 134, and 137.

In addition the Pittsburgh Steamship Company operates under agreement the steamships Murphy and Shaw.

VESSELS OPERATED BY THE PITTSBURGH STEAMSHIP COMPANY.

The Pittsburgh Steamship Company now owns or operates 101 vessels, of which 72 are steamships and 29 are barges. Based on an average of 19 trips each season these vessels have an annual ore-

carrying capacity of 10,799,828 tons, or an average on each trip of 568,412 tons.

In 1902, which was an unusually long season, extending from April 3 to December 15, the actual tonnage carried by the steamships and barges operated by the company was 10,777,636 tons of iron ore and 179,217 tons of miscellaneous freight: total, 10,956,853 tons. The gross earnings amounted to \$9,059,999.94.

During the season of 1903, which extended from April 9 to December 6, the tonnage carried by the vessels operated by the Pittsburgh Steamship Company amounted to 9,722,059 tons, of which 8,885,060 tons were iron ore and 836,999 tons were miscellaneous freight, a decrease of 1,234,794 tons as compared with 1902. The gross earnings of the fleet in 1903 amounted to \$8,068,663.91.

During the season of 1904, which extended from June 16 to December 19, the tonnage carried by the vessels operated by the Pittsburgh Steamship Company amounted to 9,193,678 tons, of which 8,462,684 tons were iron ore and 730,994 tons were miscellaneous freight, a decrease in gross tonnage of 528,381 tons as compared with 1903. Gross earnings of the fleet, \$6,765,353.28.

During the season of 1905, which extended from April 10 to December 12, the tonnage carried by the vessels operated by the Pittsburgh Steamship Company amounted to 11,899,364 tons, of which 11,341,539 tons were iron ore and 557,825 tons were miscellaneous freight, an increase of 2,705,686 tons as compared with 1904. The gross earnings of the fleet were \$8,972,441.16.

During the season of 1906, which extended from April 11 to December 17, the tonnage carried by the vessels operated by the Pittsburgh Steamship Company amounted to 12,289,626 tons, of which 11,368,827 tons were iron ore and 920,799 tons were coal, an increase of 390,262 tons as compared with 1905. The gross earnings of the fleet in 1906 amounted to \$9,076,112.01.

IRON ORE DOCKS.

At Two Harbors, Minn., the Duluth and Iron Range Railroad Company owns 5 large forwarding ore docks, and at Duluth, Minn., the Duluth, Missabe, and Northern Railway Company owns 4 forwarding docks. Receiving ore docks are owned at the blast furnace plants of the subsidiary companies of the Corporation at Chicago, Milwaukee, Lorain, and Cleveland. Receiving and forwarding docks at Lake Erie ports are owned by the Pittsburgh and Conneaut Dock Company, at Conneaut; the Carnegie Steel Company (of New Jersey), at Ashtabula; and the Pennsylvania and Lake Erie Dock Company, at Fairport, Ohio.

REPUBLIC IRON AND STEEL COMPANY.

Republic Iron and Steel Company; general offices, Frick Building Annex, Pittsburgh; executive offices, Realty Building, 115 Broadway, New York; principal offices in the State of New Jersey, 15 Exchange Place, Jersey City. *Officers at Pittsburgh:* John A. Topping, President; T. W. Guthrie, Assistant to President; T. J. Bray, Vice President; Severn P. Ker, Vice President and General Sales Manager; H. L. Rownd, Secretary and Treasurer; C. M. Pierce, General Auditor; Thomas R. Akin, General Superintendent; and G. S. Lacey, Assistant Purchasing Agent. *Officer at Chicago:* Walter L. Lee, Purchasing Agent, First National Bank Building. *Sales Offices:* Realty Building, New York; Citizens Building, Cleveland; First National Bank Building, Chicago; Missouri Trust Building, St. Louis; Endicott Building, St. Paul; First National Bank Building, Cincinnati; Woodward Building, Birmingham; and Frick Building Annex, Pittsburgh.

Capital stock authorized, \$25,000,000 of preferred and \$30,000,000 of common; issued, \$20,852,000 of preferred and \$27,352,000 of common. The Republic Iron and Steel Company operates the following blast furnaces, rolling mills, steel works, etc.:

BLAST FURNACES—9.

Atlantic Furnace, New Castle, Pa. One stack, 75 x 15½; originally established in 1868; remodeled in 1902 and again in 1906-7; four side-combustion stoves, each 80 x 18; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 105,000 tons. (Formerly operated by the Atlantic Iron and Steel Company.)—*Active in 1907.*

Hall Furnace, Sharon, Pa. One stack, 62 x 14½; established in 1845; last rebuilt in 1906; five iron-pipe stoves; fuel, coke; ore, Lake Superior; product, Bessemer, mill, and foundry pig iron; annual capacity, 50,000 tons.—*Active in 1907.*

Hannah Furnace, Youngstown, Ohio. One stack, 75½ x 15½; established in 1880; first put in blast June 14, 1880; since rebuilt and recently remodeled; two Cowper-Kennedy and three Massicks & Croke stoves; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 105,000 tons.—*Active in 1907.*

Haselton Furnaces, Youngstown. Furnaces at Haselton. Three stacks: No. 1, 74½ x 15½, built in 1867 and since rebuilt; recently remodeled. No. 2, 85 x 19½, construction commenced in June, 1905, and first blown in October 3, 1906. No. 3, 85 x 20½, con-

struction commenced in November, 1905, and first blown in January 1, 1907. No. 1 has four Cowper-Kennedy stoves and Nos. 2 and 3 have each four Julian Kennedy stoves. Fuel, coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 385,000 tons. Equipped with one double strand Uehling pig-iron casting machine. Molten metal is shipped direct to the company's Bessemer converters at Youngstown.—*All active in 1907.*

Pioneer Furnaces, Thomas, Ala. Three stacks, each 90 x 18½; No. 1 built in 1886-8, blown in May 15, 1888, and rebuilt and remodeled in 1903; No. 2 built in 1889-90, blown in February 22, 1890, and rebuilt and remodeled in 1903; No. 3 built in 1901-2 and blown in June 13, 1902; twelve Massicks & Crooke stoves; fuel, Alabama coke from the company's ovens; ores, red and brown hematite from the company's mines; product, foundry and mill pig iron; total annual capacity, 270,000 tons. Brand, "Pioneer." (Formerly operated by the Pioneer Mining and Manufacturing Company.)—*Furnaces Nos. 2 and 3 active in 1907.*

Total annual capacity of the 9 furnaces: 915,000 gross tons.

ROLLING MILLS AND STEEL WORKS—10.

Alabama Works, Gate City, Alabama. Established in 1887-8; put in operation in February, 1888; since remodeled; 23 single puddling furnaces, 2 gas heating furnaces, and 3 trains of rolls (18-inch muck and 8 and 16-inch bar); product, bars, bands, hoops, light T rails, angles from 1 inch to 2½ inches, and light channels; annual capacity, 24,000 tons. Fuel, coal and producer gas.

Bessemer Plant, Youngstown. Original plant, established in 1900, contained two 6-gross-ton Bessemer converters and one 32-inch blooming mill; first steel made in September, 1900; enlarged in 1902-3; plant now contains two 10-gross-ton Bessemer converters, 6 cupolas, one 250-ton metal mixer, 5 soaking pits, one 40-inch blooming mill, one 26-inch semi-continuous mill for 3 and 4-inch billets, one 18-inch continuous mill for 1½-inch, 1¾-inch, and 2-inch billets, and one 28-inch combination rail and sheet bar mill with one 3-high and one 2-high stand; first steel rail rolled April 22, 1905; first sheet bar rolled in May, 1905; product, ingots, billets, sheet and tinplate bars, and rails; annual capacity, 500,000 tons of ingots, 450,000 tons of billets, and 600,000 tons of rails or sheet and tinplate bars. Fuel, coke, producer gas, and coal. Molten metal from the Haselton Furnaces is used in the Bessemer converters.

Birmingham Mill, Birmingham, Alabama. Established in 1880; first put in operation in July, 1880; since enlarged and recently remodeled; 11 double and 24 single puddling furnaces, one scrap gas furnace, 7 gas, 4 box annealing, 2 pair, and 4 sheet heating

and annealing furnaces, 9 trains of hot rolls, (one 8-inch guide, one 12 and one 16-inch bar, two 18-inch forge, two 24-inch sheet, one 26-inch plate, and one 24-inch finishing,) and one cold sheet train; product, iron and open-hearth steel bars, plates, sheets, angles, round-edge tire, small T rails, fish-plates, railroad spikes, etc.; annual capacity, 70,000 tons of rolled material. Fuel, coal and producer gas. Two Siemens basic open-hearth steel furnaces (one 20 and one 25-gross-ton) connected with these works are leased to and operated by the Tennessee Coal, Iron, and Railroad Company. (Formerly called the Birmingham Rolling Mills and operated by the Birmingham Rolling Mill Company.)—See page 198.

Brown Bonnell Works, Youngstown. Established in 1846; rebuilt in 1904 and previous years; 19 double puddling furnaces, one squeezer, 4 continuous and 3 regenerative gas and 5 coal-fired heating furnaces, 10 trains of rolls, (one 20-inch puddle, one 7, one 8, and one 10-inch continuous, one 10-inch guide, one 8-inch hoop, one 12, one 18, and one 20-inch bar, and one 20-inch universal,) 6 spike machines, and 5 washer machines; product, all kinds of bar iron and steel, hoops, angles, spikes, washers, etc.; annual capacity, 225,000 tons of rolled products, 8,000 tons of spikes, and 800 tons of washers. Fuel, producer gas and coal. The works are also equipped with hydraulic cranes, shears, etc.

Corns Works, Massillon, Ohio. Established in 1873-5; put in operation January 4, 1875; 4 single puddling and 4 scrap furnaces, one regenerative gas heating furnace, and 2 trains of rolls (one 9 and one 18-inch); product, common and refined bar iron; specialties, shapes to pattern and iron for agricultural implements; annual capacity, 14,400 tons. Fuel, coal and producer gas.

Inland Works, East Chicago, Indiana. Established in 1889; first put in operation September 15, 1889; recently rebuilt and enlarged; 14 double and 9 single puddling furnaces, 7 heating furnaces, and 6 trains of rolls (one 18 and one 22-inch muck, one 8 and one 9-inch Belgian, and one 16 and one 18-inch finishing); product, bar iron and steel; annual capacity, 84,000 tons. Fuel, coal.

Mahoning Valley Works, Youngstown. Established in 1871; since remodeled; 25 double puddling furnaces, one single and 2 double busheling furnaces, 7 coal and 4 gas heating furnaces, two 20-inch muck trains, and 6 trains of finishing rolls (one 7, one 9, one 12, one 16, one 18, and one 24-inch); product, merchant bar iron, angle, tank, and plate iron, etc.; annual capacity, 110,000 tons. A plant for the manufacture of "Acme" polished shafting is connected with the works; also a plant for the manufacture of gray iron castings. Fuel, producer gas and coal. (Cut-nail department, formerly equipped with 55 machines, dismantled.)

Sylvan Works, Moline, Illinois. Established in 1894; first put in operation in December, 1894; recently remodeled and enlarged; one Morgan continuous furnace, one Siemens heating furnace, one 12-inch guide mill, and one 8-inch Morgan continuous mill; product, soft and hard merchant steel, steel agricultural shapes, and small T rails; annual capacity, 72,000 tons. Fuel, producer gas.

Toledo Works, East Toledo, Ohio. Established in 1883-4; since rebuilt and remodeled; one single and 7 double puddling furnaces, 5 heating furnaces, 6 scrap furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, iron and steel merchant bar and band iron; annual capacity, 36,000 tons. Fuel, coal.

Tudor Works, East St. Louis, Illinois. Established in 1873; first put in operation in January, 1873; recently remodeled; 2 double puddling furnaces, 9 single busheling furnaces, 11 heating furnaces, 6 trains of rolls, and 10 automatic and 8 hand spike machines; product, railroad splices, T rails, bar iron, and bolts, nuts, and spikes; annual capacity, 62,000 tons of finished rolled material and 12,600 tons of spikes. Fuel, coal and producer gas.

Total annual capacity of the 10 rolling mills and steel works: 500,000 gross tons of Bessemer steel ingots, 450,000 tons of Bessemer steel billets, 600,000 tons of sheet and tinplate bars or standard sizes of rails, 20,600 tons of spikes, 800 tons of washers, and 697,400 tons of bars, bands, sheets, angles, plates, agricultural shapes, and other finished rolled iron and steel products.

BOLT, NUT, WASHER, AND SPIKE WORKS.

Brown Bonnell Works, Youngstown. Product, railroad and boat spikes and washers; number of spike machines, 6; number of washer machines, 5; annual capacity, 8,000 tons of spikes and 800 tons of washers.

Indiana Works, Muncie. Product, bolts, nuts, and washers. Sizes: bolts, usual sizes for carriages, machinery, plows, coaches, etc.; nuts, usual sizes and all kinds. Also make gimlet-pointed coach screws.

Tudor Works, East St. Louis, Illinois. Product, iron and steel bolts, iron nuts, and iron and steel railroad and boat spikes. Sizes: bolts, $\frac{3}{8}$ of an inch and larger; nuts, from $\frac{1}{4}$ of an inch to 2 inches; spikes, standard sizes. Annual capacity of spikes, 12,600 tons.

TURNBUCKLES, CASTINGS, AND COLD-DRAWN SHAFTING.

Indiana Works, Muncie, Indiana. Product, Williams's wrought-iron open hexagonal turnbuckles; annual capacity, 400,000 turnbuckles.

Mahoning Valley Works, Youngstown. Product, gray iron castings, all consumed by the company.

Valley Shafting Works, Youngstown. Product, cold-drawn steel

piston rods, pump rods, lead screws, fine machine rods, and line shafting; sizes, from $\frac{1}{4}$ of an inch to 6 inches round; annual capacity, from 7,500 tons to 10,000 tons. Do not draw iron.

IRON-ORE MINES.

In the Lake Superior region the company operates the Cambria and Lillie iron-ore mines in the Marquette Range and the Bessemer, Victoria, Franklin, Pettit, Kinney, Alexander, Onondaga, Monica, and Mariska mines in the Mesabi Range. The company also owns and is developing the Wills and Fay iron-ore properties in the Mesabi Range. A large amount of exploration work is also being carried on. The company also owns a one-half interest in the Union Ore Company and an interest in the Mahoning Ore and Steel Company, which operate mines in the Mesabi Range. In addition it owns a one-half interest in the Antoine Ore Company, which operates the Clifford mine in the Menominee Range. It has also numerous long term contracts for the purchase of other ores. In addition the company owns and operates 26,000 acres of red and brown iron-ore and coal property in Alabama. It has a number of mines in operation on this property which furnish iron-ore for the Pioneer Furnaces at Thomas, Alabama.

COAL LANDS AND COKE OVENS.

The Republic Iron and Steel Company owns about 1,900 acres of steam coal lands in Washington county, Pa. It owns and operates in Alabama the Warner and Sayreton coal mines, extensive limestone quarries, and 1,010 coke ovens; also the necessary railroad tracks and equipment for handling and transporting raw material from these properties to the Pioneer Furnaces. In addition the Republic Iron and Steel Company owns about 2,000 acres of coking coal lands in Fayette county, Pa., where it operates 443 coke ovens—138 ovens at Gans and 305 ovens at Republic. These ovens have an annual capacity of about 265,000 net tons of coke. In addition it will erect 172 ovens at Republic, with an annual capacity of about 103,200 net tons of coke.

LIMESTONE QUARRIES, ETC.

The Republic Iron and Steel Company also owns an interest in the Lake Erie Limestone Company and the Union Limestone Company, which operate limestone quarries near Carbon, Pa.; the Union Dock Company and the Mahoning and Shenango Dock Company, which operate ore docks on Lake Erie; and the French Transportation Company, which is engaged in the ore-carrying trade on the Great Lakes.

LACKAWANNA STEEL COMPANY.

Lackawanna Steel Company, West Seneca, New York, (post-office, Buffalo; railroad address, Lackawanna.) New York offices, U. S. Express Building. *Officers at New York:* E. A. S. Clarke, President and Chairman of the Board of Directors; Moses Taylor, Vice President; Arthur J. Singer, Assistant to President; James P. Higginson, Treasurer; F. F. Graham, Secretary; Herbert Melvin, Assistant Treasurer and Assistant Secretary; H. Sanborn Smith, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo:* C. H. McCullough, Jr., Vice President and General Manager; Marshall Lapham, Comptroller; S. B. Sheldon, General Superintendent; and John N. Allen, General Purchasing Agent.

Sales Department: H. Sanborn Smith, General Sales Agent, U. S. Express Building, New York. *District Sales Agents:* James W. Sederquist, 8 Oliver st., Boston, for New England; C. D. Rhodes, 301 Citizens Building, Cleveland, for Northern Ohio and Indiana; Charles E. McInnes, Land Title Building, Philadelphia, for Eastern Pennsylvania; Edmund W. Mudge & Co., Frick Building, Pittsburgh, for Western Pennsylvania and West Virginia; Cincinnati Iron Store Company, Front and Freeman sts., Cincinnati, for Southern Ohio, Indiana, Kentucky, and Tennessee; J. E. Franks, 124 Bay st. East, Savannah, for South Atlantic States; John P. Nicholas, Commercial National Bank Building, Chicago, for Central Western States; Jay C. McLauchlan, Penobscot Building, Detroit, for Michigan; and C. W. Pike Company, 9 Mission st., San Francisco, for the Pacific Coast and Alaska. *Export Department:* Emil Baerwald, United States Express Building, New York, and Lewis Lazarus & Son, London, England.

Capital stock authorized, \$60,000,000; issued, \$35,000,000; par value, \$100 per share. First mortgage 5 per cent. convertible gold bonds, dated April 1, 1903: authorized, \$20,000,000; issued, \$15,000,000. Thirty-year first consolidated 5s, dated March 1, 1905: authorized issue, \$30,000,000; of these bonds \$12,500,000 have been pledged for present needs to secure \$10,000,000 of five-year 5 per cent. gold notes, dated March 1, 1905, subject to call on any interest day at par; \$2,500,000 have been pledged for present needs to partially secure \$5,000,000 of two-year 5 per cent. gold notes, dated March 1, 1907, subject to call on any interest day at par; and \$15,000,000 are reserved to retire the \$15,000,000 first mortgage 5s. The company operates or controls these works:

BLAST FURNACES—7.

Lackawanna Furnaces, Lackawanna, N. Y. Seven stacks: Nos. 1 and 2, each 87 x 17, built in 1901-2; No. 3, 94 x 24, built in 1902-4; Nos. 4 and 5, each 94 x 24, built in 1902-5; No. 6, 94 x 22, built in 1902-6; and No. 7, 85 x 22, built in 1906-7. Nos. 1 and 2 are each equipped with four central-combustion stoves, each 85 x 18; Nos. 3, 4, 5, and 6 are each equipped with four central-combustion stoves, each 121 x 22; and No. 7 is equipped with four 2-pass central-combustion stoves, each 110 x 22. First blasts: No. 1, February 11, 1903; No. 2, May 2, 1903; No. 3, June 9, 1904; No. 4, January 21, 1905; No. 5, September 3, 1905; No. 6, May 1, 1906; and No. 7, February 12, 1907. Fuel, coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 1,080,000 tons. Brand, "Lackawanna." Molten metal from these furnaces is used in the Bessemer converters and open-hearth furnaces of the company. Gas from the blast furnaces is largely used for power purposes.—*All active in 1907.*

Total annual capacity of the 7 furnaces: 1,080,000 gross tons.

ROLLING MILLS AND STEEL WORKS.

Lackawanna Steel Works, Lackawanna, N. Y. Bessemer and open-hearth steel works, rail mills, plate mill, merchant mill, structural mill, etc. Brand, "Lackawanna."

Bessemer Department; built in 1902-3; four 10-gross-ton acid-Bessemer converters and 8 iron and 4 spiegel cupolas; first Bessemer steel made October 13, 1903; product, ingots and castings, the latter for the use of the company only; annual capacity, 845,000 tons. Fuel, coke. Molten metal from the Lackawanna Furnaces is used in the Bessemer converters.

Rail Mill No. 1; built in 1902-3; five 4-hole heating pits and 6 stands of 32-inch rolls; first steel rails rolled October 20, 1903; product, steel rails; annual capacity, 600,000 tons. Fuel, bituminous coal, coke, and producer gas.

Rail Mill No. 2; rail train on one side of the building and structural train on the other; built in 1902-4; first steel rails rolled July 5, 1904; first structural shapes rolled September 15, 1904; 7 continuous gas heating furnaces and 5 stands of 24-inch rolls; product, structural shapes, splice bars, and light rails; annual capacity, 140,000 tons of structural shapes, 40,000 tons of splice bars, and 70,000 tons of 12 to 65-lb. rails. Fuel, coal and producer gas.

Slabbing Mill; built in 1903-4; first put in operation October 16, 1904; one 32-inch mill and four 4-hole soaking pits; product, slabs, blooms, and billets; annual capacity, 240,000 tons. Fuel, coal.

Blooming Mill; built in 1904-5; first put in operation November

- 27, 1905; one 40-inch blooming mill and four 4-hole soaking pits; product, billets; annual capacity, 300,000 tons. Fuel, coal.
- Universal Mill; built in 1903-4; first put in operation November 5, 1904; one 48-inch universal mill and 6 Siemens heating furnaces; product, universal plates up to 48 inches wide and shear plates up to 72 inches wide; annual capacity, 150,000 tons. Fuel, coal.
- Merchant Mill; built in 1903-5; first put in operation January 31, 1905; one 8, 12, and 16-inch combination merchant mill and 2 continuous heating furnaces; product, all sizes and shapes of bars for carbuilders and agricultural implement and bolt manufacturers; annual capacity, 75,000 tons. Fuel, bituminous coal.
- Continuous Sheet Bar and Billet Mill; now under construction; to be put in operation in October, 1907; one 10-stand 18-inch mill fitted with duplicate housings for sheet bars and small billets; annual capacity, 175,000 tons. Fuel, bituminous coal.
- Open-Hearth Steel Department; built in 1903-4; eleven 60-gross-ton Siemens basic open-hearth furnaces; first 6 furnaces built in 1903-4, with an annual capacity of 250,000 tons, and last 5 furnaces built in 1905-6, with an annual capacity of 250,000 tons; first basic open-hearth steel made September 26, 1904; total annual capacity, 500,000 tons of ingots and direct castings, the latter for the use of the company only. Fuel, producer gas. Molten metal from the Lackawanna Furnaces is used in the open-hearth furnaces.
- Total annual capacity of the rolling mills and steel works, including the building continuous sheet bar and billet mill: 845,000 gross tons of Bessemer steel ingots, 600,000 tons of standard sizes of steel rails, 500,000 tons of open-hearth steel ingots and castings, 140,000 tons of structural shapes, 40,000 tons of splice bars, 70,000 tons of light rails, 540,000 tons of slabs, blooms, and billets, including forging blooms and forging billets, 175,000 tons of sheet bars and small billets, 150,000 tons of universal and shear plates, and 75,000 tons of merchant bars.
- Grand total of rolling mills and steel works: 1,345,000 gross tons of steel ingots and castings, 540,000 tons of slabs, blooms, and billets, including forging blooms and forging billets, 175,000 tons of sheet bars and small billets, 670,000 tons of standard and light rails, and 405,000 tons of other finished products.

IRON, STEEL, AND BRASS FOUNDRIES.

The company owns and operates foundries at Lackawanna for the manufacture of iron, steel, and brass castings; annual capacity, 6,000 tons of iron castings, 30,000 tons of moulds and stools, 1,500 tons of open-hearth and Bessemer steel castings for its own use, and 300 tons of brass castings; total annual capacity, 37,800 tons.

RAILROADS, COKE OVENS, AND IRON-ORE PROPERTIES.

The Lackawanna Steel Company owns the South Buffalo Railway Company, which operates 35.51 miles of track, 24 locomotives, 20 passenger cars, and 217 freight and other cars.

The company also owns 470 completed by-product coke ovens (188 Otto-Hoffmann and 282 Rothberg) at Lackawanna, N. Y. In addition it controls 237 completed Otto-Hoffmann and Rothberg by-product ovens owned by the Lackawanna Iron and Steel Company at Lebanon, Pa. These ovens have a total annual capacity of 1,064,000 net tons of coke.

On January 1, 1907, the Lackawanna Steel Company purchased from the Ellsworth Coal Company its properties in Washington county, Pa., consisting of from 15,000 to 16,000 acres of coking coal lands and several active coal mines, the latter having an annual output of approximately 2,000,000 tons. On the property at the time of the purchase there were 278 completed bee-hive coke ovens, with an annual capacity of 180,000 net tons of coke. The Lackawanna Steel Company is building on the property 205 additional ovens, with an annual capacity of 138,000 net tons.

The iron-ore interests of the Lackawanna Steel Company are represented by extensive leaseholds, (including a one-half interest in the leasehold of the Negaunee mine in Michigan,) by contracts for the purchase of mined ore, and by shareholdings in the following companies: Witherbee, Sherman & Co., New York; the Odanah Iron Company, Wisconsin; the Verona Mining Company, the Brotherton Iron Mining Company, and the Sunday Lake Iron Company, of Michigan; the Scranton Mining Company, the Hobart Iron Company, and the Corsica Iron Company, of Minnesota; the Ontario Mining Company, of West Virginia; and the Tilly Foster iron mines in New York.

THE SENECA TRANSPORTATION COMPANY.

All the stock of the Seneca Transportation Company is owned by the Lackawanna Steel Company.

The Seneca Transportation Company, West Seneca, N. Y., (post-office, Buffalo.) New York offices, U. S. Express Building. *Officers at New York:* George F. McKay, President; J. P. Higginson, Treasurer; and F. F. Graham, Secretary. *Officers at Buffalo:* George W. Smith, General Superintendent; Joseph E. Donnelly, Assistant Treasurer; and Marshall Lapham, Assistant Secretary. Capital stock, \$5,000. This company operates seven steamships

and barges, chartered for the season of navigation, with an ore-carrying capacity per season of about 171,500 gross tons.

THE LACKAWANNA IRON AND STEEL COMPANY.

Practically all the stock of the Lackawanna Iron and Steel Company is owned by the Lackawanna Steel Company.

The Lackawanna Iron and Steel Company, Lebanon, Pa.; also West Seneca, N. Y., (post-office, Buffalo,) and U. S. Express Building, New York. *Officers at New York*: E. A. S. Clarke, President; Moses Taylor, Vice President; James P. Higginson, Treasurer; F. F. Graham, Secretary; Herbert Melvin, Assistant Treasurer and Assistant Secretary; H. Sanborn Smith, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo*: C. H. McCullough, Jr., Vice President and General Manager; Marshall Lapham, Comptroller; and John N. Allen, General Purchasing Agent. *Officer at Lebanon*: T. C. Clarke, Superintendent.

Capital stock authorized, \$25,000,000; issued, \$20,000,000. Bonds issued, \$1,775,000. The company operates the following works:

BLAST FURNACES—5.

Bird Coleman Furnaces, (leased,) Cornwall, Pa. Two stacks, each 75 x 17; No. 1 built in 1872-3 and No. 2 built in 1879; both rebuilt in 1885 and relined in 1903; eight pass-side combustion chamber Whitwell stoves; fuel, coke and occasionally some anthracite coal mixed with coke; ore, Cornwall; product, principally Bessemer pig iron; total annual capacity, 85,000 tons. Brand, "Lackawanna." (Owned by the Cornwall Iron Company.)—*Both active in 1907.*

Colebrook Furnaces, (owned,) Lebanon, Pa. Two stacks: No. 1, 81½ x 17, built in 1881, remodeled in 1887, rebuilt in 1895, and relined in 1903; No. 2, 85 x 17, completed in November, 1882, and relined in 1903; eight 2-pass centre-combustion chamber Lackawanna stoves; fuel, coke and occasionally some anthracite coal mixed with coke; ore, Cornwall; product, principally Bessemer pig iron and spiegeleisen; total annual capacity, 100,000 tons. Brand, "Lackawanna."—*Both active in 1907.*

North Cornwall Furnace, (leased,) Cornwall, Pa. One stack, 77 x 17; built in 1872, rebuilt in 1890, and relined in 1903; three Whitwell stoves; fuel, coke and occasionally some anthracite coal mixed with coke; ore, Cornwall; product, principally Bessemer pig iron; annual capacity, 35,000 tons. Brand, "Lackawanna." (Owned by the Cornwall Iron Company.)—*Active in 1907.*

Total annual capacity of the 5 furnaces: 220,000 gross tons.

IRON-ORE PROPERTIES AND COKE OVENS.

The Lackawanna Iron and Steel Company owns a one-sixth interest in the Cornwall ore banks at Cornwall, Pa. It also has an additional voting interest. In addition it owns and operates 237 completed by-product coke ovens at Lebanon, of which 232 ovens are of the Otto-Hoffmann type and 5 ovens are of the Rothberg type. These ovens were first put in operation in March, 1903.

THE LACKAWANNA COAL AND COKE COMPANY.

All the stock of the Lackawanna Coal and Coke Company is owned by the Lackawanna Steel Company.

The Lackawanna Coal and Coke Company, Wehrum, Pa.; also West Seneca, N. Y., (post-office, Buffalo,) and U. S. Express Building, New York. *Officers at New York*: E. A. S. Clarke, President; Moses Taylor, Vice President; James P. Higginson, Treasurer; F. F. Graham, Secretary; Herbert Melvin, Assistant Treasurer and Assistant Secretary; H. Sanborn Smith, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo*: C. H. McCullough, Jr., Vice President and General Manager; Marshall Lapham, Comptroller; and John N. Allen, General Purchasing Agent. *Officer at Wehrum*: W. N. Johnson, Superintendent. Capital stock, \$500,000.

The Lackawanna Coal and Coke Company owns 12,186 acres of coal rights in Cambria and Indiana counties, Pennsylvania, and 5,091 acres of coal lands in fee in the same counties. Its coal mines have an annual capacity of about 756,000 gross tons.

THE FRANKLIN IRON COMPANY.

All the stock of the Franklin Iron Company is owned by the Lackawanna Steel Company.

The Franklin Iron Company, Franklin Furnace, N. J.; also West Seneca, N. Y., (post-office, Buffalo,) and U. S. Express Building, New York. *Officers at New York*: E. A. S. Clarke, President; Moses Taylor, Vice President; J. P. Higginson, Treasurer; and F. F. Graham, Secretary. *Officer at Franklin Furnace, N. J.*: William H. Tonking, Superintendent. Capital stock, \$300,000.

The Franklin Iron Company owns 650 acres of farm lands and about 7,000 acres of mountain lands.

BETHLEHEM STEEL CORPORATION.

The Bethlehem Steel Corporation is the successor of the United States Shipbuilding Company.

Bethlehem Steel Corporation; principal offices, 763 Broad st., Newark, N. J. *Officers*: Charles M. Schwab, President and Chairman Board of Directors, 111 Broadway, New York; Archibald Johnston, Vice President, Henry S. Snyder, Second Vice President, B. H. Jones, Secretary and Treasurer, A. T. Rush, Assistant Secretary and Assistant Treasurer, and F. A. Shick, Comptroller, 100 Broadway, New York.

Capital stock, \$30,000,000, of which \$15,000,000 is 7 per cent. non-cumulative preferred and \$15,000,000 is common.

The Bethlehem Steel Corporation owns all the stock of the Bethlehem Steel Company, the Union Iron Works Company, the Harlan and Hollingsworth Corporation, the Eastern Shipbuilding Corporation, the Crescent Shipyard Corporation, the Samuel L. Moore and Sons Corporation, and the Carteret Improvement Company. Descriptions of the plants and properties of all the companies named above will be found on the following pages.

BETHLEHEM STEEL COMPANY.

Bethlehem Steel Company; principal offices, Pennsylvania Building, northwest corner Fifteenth and Chestnut sts., Philadelphia; general offices, South Bethlehem, Pa. *Officers at South Bethlehem*: Archibald Johnston, President; Henry S. Snyder, Vice President; B. H. Jones, Secretary and Treasurer; J. Kernan, Assistant Secretary and Assistant Treasurer; E. G. Grace, General Superintendent; R. S. Van Horn, Purchasing Agent; Frederick Conlin, General Manager of Sales; and F. A. Shick, Auditor.

Selling Agencies: A. D. Mixsell, American Surety Building, 100 Broadway, New York; W. B. Kennedy, Pennsylvania Building, Philadelphia; E. S. Knisely, Keystone Bank Building, Pittsburgh; Walter Miller, Rockefeller Building, Cleveland; R. C. Yates, Fisher Building, Chicago; John F. Larkin, Endicott Building, St. Paul; L. H. Atkinson, Massachusetts Building, Kansas City, Mo.; Morse Bros., Denver; E. S. Illig, James Flood Building, San Francisco.

Capital stock, \$15,000,000, all common, and all formerly owned by the United States Shipbuilding Company. The Bethlehem Steel Company operates the following works:

BLAST FURNACES—5 COMPLETED, 1 PARTLY ERECTED, AND 3 PROJECTED.

Bethlehem Furnaces, South Bethlehem, Pa. Five completed stacks and one stack partly erected: No. 2, 70 x 18, built and blown in in 1867 and rebuilt in 1877 and 1905; No. 4, 70 x 18, built in 1874-5 and blown in in 1876; No. 5, 70 x 18, built in 1874-5 and blown in in 1877; No. 6, 70 x 18, built in 1881, blown in in 1883, and rebuilt in 1906; Furnace E, 90 x 22, built in 1905-7 and blown in April 22, 1907. Furnaces Nos. 2, 4, 5, and 6 have sixteen Whitwell stoves and two new McClure stoves, each 100 x 22, are being added—one to No. 2 and one to No. 4; and Furnace E has five McClure stoves, each 100 x 22. Fuel, anthracite coal and Connellsville coke; product, Bessemer, basic, low-phosphorus, and foundry pig iron made from local and foreign hematite and magnetic ores; annual capacity, 369,000 tons. Equipped with one Davies pig-iron casting machine; also with one circular pig-iron casting machine. Molten metal is used in the open-hearth furnaces at South Bethlehem; also in the open-hearth furnaces at the Saucon Plant. Furnaces Nos. 4, 5, and 6 are to be enlarged or replaced by new furnaces, each 90 x 22. Three additional furnaces, each 90 x 22, are projected. Furnace No. 8 partly erected; foundations laid in 1892; work suspended.—*Completed furnaces all active in 1907.*

Total annual capacity of the 5 completed furnaces: 369,000 gross tons of Bessemer, basic, low-phosphorus, and foundry pig iron.

ROLLING MILLS.

Bethlehem Steel Works, South Bethlehem, Pa. Established in 1860.

Rolling mill started in 1863 to roll iron rails; Bessemer steel works added in 1873 and dismantled in 1902-4; 15 double puddling furnaces, 8 heating furnaces, and 4 trains of rolls (one 21-inch muck and one 12, one 22, and one 16 and 12-inch tandem finishing); product, open-hearth steel blooms, billets, beams, tees, angles, brake beams, nickel and nickel-chrome steel bars, spring, screw, and wire steel, muck bar, staybolt iron, file steel, etc.; annual capacity, 18,000 gross tons of muck bar and 50,000 gross tons of finished rolled products. Fuel, bituminous coal.

OPEN-HEARTH STEEL AND FORGE AND ARMOR PLATE DEPARTMENTS.

Open Hearth Steel Department. Eleven open-hearth steel furnaces (one 10, one 15, one 20, and four 40-gross-ton acid and two 30 and two 50-gross-ton basic) and one preheater; first acid open-hearth steel made August 11, 1888, and first basic open-hearth

steel made January 3, 1893; an ingot weighing 104 tons has been cast; annual capacity, 100,000 tons of acid and 90,000 tons of basic ingots. Fuel, manufactured gas. Molten metal from the Bethlehem Furnaces is used in this department.

Forge and Armor Plate Department. Connected with the completed open-hearth steel furnaces is a plant for the fluid compression of steel, (press taking an 18-foot ingot,) a forging plant containing 3 hydraulic forging presses, (one 2,500, one 5,000, and one 14,000 tons' pressure,) 17 hammers for making small forgings ranging from 1,100 pounds to 8 tons, and one 7,000-ton bending press for heavy armor; also 3 oil-tempering and annealing plants (2 for gun and other forgings and one for armor plate) and one plant for treating armor by the cementation process. These plants contain 70 heating furnaces, which are supplied with gas by 112 gas producers, and an illuminating gas plant. A crucible steel plant, containing two 30-pot steel-melting furnaces, a 12-inch roughing and an 8-inch finishing tandem hot mill, and a forge shop equipped with the necessary furnaces and hammers for doing all kinds of crucible steel work, is connected with this department; also 4 machine shops (3 for general work, rough-machining and finishing forgings, and for heavy ordnance, and one for trimming and machining armor plates) and a steel foundry. Product, steel forgings and castings of all descriptions and of the largest dimensions and weight, marine and stationary engine cranks, (forged solid or built-up,) shafting, (forged solid or hollow,) gun carriages, heavy and light ordnance of all calibres, forged armor plates, and projectiles of all sizes; also all grades of steel billets and self-hardening and carbon tool steels. The department is fully equipped with all necessary appliances and machinery for filling the requirements of the Government and ship and engine builders of the country for heavy steel shafting and miscellaneous forgings of the best quality. Total annual capacity of armor plate department, 12,000 tons. Fuel, manufactured gas.

The company also builds specially designed machinery, including tire mills, wheel rolling mills, planing and upsetting machines, hydraulic presses, shears, riveters, pumping engines, etc.

A drop forge plant for the manufacture of all kinds of drop forgings was added in 1905. Particular attention is paid to the manufacture of automobile forgings of special grades of steel.

BUILDING ROLLING MILLS AND STEEL WORKS.

Saucon Plant, located east of the present works; construction commenced in March, 1906; when completed the plant will contain ten 50-gross-ton basic open-hearth steel furnaces, six 4-hole soak-

ing pits, 65 gas producers, one 46-inch blooming mill, one 48-inch intermediate mill, one 48-inch finishing mill with a daily capacity of 1,000 tons of wide-flanged beams, etc., one 40-inch blooming mill, one 28-inch combination rail and structural mill with a daily capacity of 1,000 tons of rails, and one 28-inch 3-high structural mill with a daily capacity of 400 tons of beams and channels up to 15 inches deep and angles from 3 to 8 inches inclusive. One 250-ton mixer has been installed and molten metal from the Bethlehem Furnaces is used in the open-hearth steel furnaces. Product, special wide-flanged rolled beams, rolled girders and rolled column shapes of H section, open-hearth, nickel-steel, and nickel-chrome steel rails, open-hearth billets, I beams, channels, angles, and other standard forms of structural shapes. An electric light and power plant will be connected with the works. —*The open-hearth furnaces and rolling mills, with the exception of the 28-inch 3-high structural mill, commenced operations in August, 1907; the structural mill will be ready in October, 1907.*

Total annual capacity of the completed rolling mills and open-hearth steel and forge and armor plate departments, not including the Saucon Plant: 190,000 gross tons of open-hearth steel ingots, 18,000 tons of muck bar, 50,000 tons of rolled products, and 12,000 tons of finished armor plates. Heavy steel shafting, steel forgings, and iron and steel castings are also largely produced.

FOUNDRIES AND STEEL CARBUILDING WORKS.

The company operates at South Bethlehem, Pa., one gray iron foundry with 6 cupolas, one brass foundry, and one steel foundry; annual capacity, 60,000 tons of iron castings, 15,000 tons of open-hearth steel castings, and 350 tons of brass castings.

The company also builds steel cars at South Bethlehem. It makes a specialty of side dump cars up to a capacity of 100,000 pounds.

IRON-ORE MINES, LIMESTONE QUARRIES, ETC.

The Bethlehem Steel Company owns all the capital stock of the Juragua Iron Company, which owns 2,211 acres of iron-ore lands at Firmeza, in the Province of Santiago, Cuba. It has 17 mines in operation, with an annual capacity of 300,000 tons. It also owns 29 miles of railroad and 8 miles of mining track, and has 7 large and 19 small locomotives and 1,550 cars. Its main offices are at South Bethlehem, Pa., and it has branch offices at Santiago, Cuba, and in the Pennsylvania Building, Philadelphia. *Officers:* Archibald Johnston, President; Henry S. Snyder, Vice President; B. H. Jones, Secretary and Treasurer; and D. B. Whitaker, General Superintendent. Capital stock, \$600,000, all common.

The Bethlehem Steel Company also operates limestone quarries located at McAfee, New Jersey, and Redington, Pennsylvania, with an annual capacity of 200,000 tons. Its limestone holdings amount to 187 acres.

At Redington, Pa., on the Lehigh Valley Railroad, the company has a complete proving ground for armor plates and ordnance.

UNION IRON WORKS COMPANY.

Union Iron Works Company; principal offices, 763 Broad st., Newark, N. J.; general offices, at the works at Potrero, San Francisco. *Officers:* Archibald Johnston, Chairman of Board of Directors; John A. McGregor, President; and B. H. Jones, Assistant Secretary and Assistant Treasurer.

Capital stock, \$2,000,000, all common. (Formerly called the Union Iron Works and stock formerly owned by the United States Shipbuilding Company.) The Union Iron Works Company operates the steel casting and other plants described below:

STEEL-CASTING AND FORGING WORKS AND SHIPYARDS.

Union Iron Works, San Francisco. Works at Potrero. One 2-gross-ton Tropenas steel converter erected in 1899; first steel made November 4, 1899; product, steel castings, consumed in the company's shipbuilding plant; annual capacity, 2,000 tons. Fuel, coke and oil. Steel plant may be enlarged.

Union Forging Works, San Francisco. Works at Potrero. Product, iron and steel forgings for use of the company in mining and shipbuilding. Also build engines, boilers, etc.

Union Shipbuilding Yards, San Francisco. Yards at Potrero. Product, battleships, steamships, steam tugs, etc. Dry docks are connected with the yards. Also a large bending press for handling and shaping heavy steel plates for ship work.

HARLAN AND HOLLINGSWORTH CORPORATION.

Harlan and Hollingsworth Corporation; general offices, Wilmington, Delaware. *Officers:* William G. Coxe, President; Persifor Frazer, Jr., Vice President; Henderson Weir, Secretary; and S. K. Smith, Treasurer. *Foreign Selling Agent:* Edward Mahoney, Moorgate Court, Moorgate Place, London, E. C., England.

Capital stock, \$1,500,000, all common, and all formerly owned by the United States Shipbuilding Company. (Formerly called the Harlan and Hollingsworth Company.)

Product, all kinds of parlor, sleeping, dining, private, passenger,

baggage, and mail cars with wooden, iron, or steel frames. Sectional work for export a specialty. Also builds all kinds of vessels, engines, boilers, etc.; dry docks are connected with the shipbuilding yards; also makes iron castings, general machinery, etc.

EASTERN SHIPBUILDING CORPORATION.

Eastern Shipbuilding Corporation; general offices, New London, Conn. Yards at Groton. *Officers*: Charles R. Hanscom, President and General Manager; Henry S. Snyder, Vice President; and B. H. Jones, Secretary and Treasurer.

Capital stock, \$300,000, all common, and all formerly owned by the United States Shipbuilding Company. Product, all kinds of vessels. (Formerly called the Eastern Shipbuilding Company.)

THE CRESCENT SHIPYARD CORPORATION.

The Crescent Shipyard Corporation; general offices, Elizabethport, Union county, New Jersey. *Officers*: Carl D. Bradley, President; Henry S. Snyder, Vice President; and J. H. Blanchard, Secretary and Treasurer.

Capital stock, \$300,000, all common, and all formerly owned by the United States Shipbuilding Company. Product, all kinds of vessels. (Formerly called the Crescent Shipyard Company.)

SAMUEL L. MOORE AND SONS CORPORATION.

Samuel L. Moore and Sons Corporation; general offices, Elizabethport, N. J. *Officers*: Carl D. Bradley, President; Henry S. Snyder, Vice President; and J. H. Blanchard, Secretary and Treasurer. Authorized capital stock, \$300,000, all common, and all formerly owned by the United States Shipbuilding Company. Engineers, machinists, and founders. (Formerly called the Samuel L. Moore and Sons Company.)

CARTERET IMPROVEMENT COMPANY.

Carteret Improvement Company; general offices, 763 Broad st., Newark, N. J. *Officers*: Archibald Johnston, President; Henry S. Snyder, Vice President; and B. H. Jones, Secretary and Treasurer. Capital stock, \$300,000, all common.

This company owns and controls the building and property at Carteret, N. J., formerly owned by the United States Shipbuilding Company, which acquired them from the Canda Manufacturing Company.

NATIONAL STEEL AND WIRE COMPANY.

National Steel and Wire Company; general offices, Engineering Building, 114 Liberty st., New York; general sales department, New Haven, Conn.; branch offices, 56-58 West Van Buren st., Chicago; De Kalb, Illinois; 100 Front st., San Francisco; 18 Post Office Square, Boston; and 304 Delaware st., Kansas City, Missouri. *Officers at New York:* Homer Wise and Harold Nathan, Receivers.

Capital stock, \$10,000,000, of which \$5,000,000 is 7 per cent. cumulative preferred and \$5,000,000 is common. The company has no bonded indebtedness. It owns securities of the following constituent companies, which operate plants at New Haven, Conn., Bayonne, N. J., De Kalb, Illinois, and Oakland, Cal.:

STEEL-CASTING, WIRE-ROD, WIRE, AND WIRE-NAIL WORKS.

De Kalb Fence Company, De Kalb, Illinois. Established in 1890; product, wire fencing and "Eagle" barbed wire; also gates, posts, and fence fittings. Equipped with a foundry and machine shop for building fence machines. Annual capacity, 12,000 tons of fence.

E. F. Shellabarger, President; Everett B. Webster, Vice President; Judson Brenner, Secretary; and LeRoy Clark, Treasurer. Kansas Steel and Wire Works, Kansas City, Missouri. A distributing company for the De Kalb and Union Fence Companies.

National Steel Foundry Company, New Haven, Conn. Built in 1903; two 25-gross-ton Siemens acid open-hearth steel furnaces; first steel made March 10, 1904; product, steel castings for all purposes; also ingots; annual capacity, 10,000 tons. Fuel, manufactured gas. H. Stuart Hotchkiss and F. B. Farnsworth, Receivers.

National (The) Wire Corporation, New Haven, Conn. Plant of the New Haven Wire Manufacturing Company purchased in February, 1899; wire-rod mill built and wire mill enlarged and improved in 1899-1900; rod mill first put in operation on March 10, 1900; wire mill started on January 5, 1903. Rod mill contains 2 double continuous heating furnaces for gas or petroleum, 4 gas producers, 18 sets of rolls, etc. Galvanizing department equipped for telegraph and telephone wire. Product: wire rods from No. 5 to $\frac{1}{8}$ of an inch; wire of all kinds from $\frac{1}{2}$ of an inch to No. 36 gauge; also all sizes of wire nails, barbed and other fence wire, wire strand and wire rope, plain and galvanized wire, and other wire specialties; number of wire-drawing blocks, 1,220; number of wire-nail machines, 55; annual capacity, 90,000 tons of wire rods,

40,000 tons of wire, 45,000 kegs of wire nails, and 5,000 tons of wire fencing, wire rope, etc. Fuel, anthracite and bituminous coal and producer gas. H. Stuart Hotchkiss, F. B. Farnsworth, and Howard F. Martin, Trustees in Bankruptcy.

Pacific Steel and Wire Company, 100 Front st., San Francisco.

Works at Oakland. Product, wire rope and other wire specialties; annual capacity, about 10,000 tons.

Safety Insulated Wire and Cable Company, 114 Liberty st., New York. Works at Bayonne, N. J. Product, complete lines of rubber insulated wires and submarine cables. LeRoy Clark, President; C. E. Graham, Vice President; George B. Wilson, Treasurer; and Henry C. White, Secretary.

Union Fence Company, De Kalb, Illinois. This company is associated with the De Kalb Fence Company. It manufactures wire fencing.

Total annual capacity of the plants described above: 90,000 gross tons of wire rods, 10,000 tons of open-hearth steel castings and ingots, 40,000 tons of wire, 45,000 kegs of wire nails, and about 35,000 tons of wire fencing, wire rope, and other wire specialties.

BARNUM RICHARDSON COMPANY.

Barnum Richardson Company; general offices, Lime Rock, Conn.; branch offices, East Canaan, Conn. Established in 1734 and incorporated in 1864. *Officers:* M. B. Richardson, President and Treasurer; C. W. Barnum, Vice President; R. N. Barnum, Secretary; and M. B. Richardson, Jr., Assistant Treasurer. All sales made by the company.

Capital stock, \$200,000, all common. The company operates the following blast furnaces, iron-ore mines, and limestone quarries:

BLAST FURNACES—3 CHARCOAL STACKS.

Canaan Furnaces, East Canaan, Conn. Two stacks: No. 1, 40 x 9½, built in 1840 and rebuilt in 1880; No. 3, 35 x 9, built in 1872; No. 1 has closed top and No. 3 open top; warm blast; steam and water power; fuel, charcoal; ore, Salisbury brown hematite; product, pig iron for car wheels, malleable castings, ordnance, and machinery, known as "Salisbury" iron; total annual capacity, 10,000 tons.—*Both active in 1907.*

Lime Rock Furnace, Lime Rock, Conn. Established in 1734; present furnace, one stack, 32 x 9, built in 1864; warm blast; water power; open top; fuel, charcoal; ore, Salisbury brown hematite;

product, pig iron for car wheels, malleable castings, ordnance, and machinery, known as "Salisbury" iron; annual capacity, 5,000 tons.—*Active in 1907.*

Total annual capacity of the 3 furnaces: 15,000 gross tons.

IRON-ORE MINES AND LIMESTONE QUARRIES.

The company owns and operates the Old Hill iron-ore mine at Ore Hill, Salisbury, Conn. In addition it operates the Davis mine, also at Salisbury. Its iron-ore holdings in Connecticut amount to about 200 acres. The mines have an annual capacity of about 30,000 tons. In addition the company owns over 300 acres of iron-ore lands in Columbia county, N. Y., on which are located the Weed mine and the Reynolds mine. The company also owns about 50 acres of limestone lands at East Canaan and at Lime Rock, on which it has quarries with an annual capacity of about 4,000 tons.

THE BURDEN IRON COMPANY.

The Burden Iron Company; general offices, Troy, N. Y. *Officers:* James A. Burden, Jr., President; Williams P. Burden, Vice President; Nicholas J. Gable, Secretary; and John L. Arts, General Manager. The company operates the following plants:

BLAST FURNACES—1.

Burden Furnace, Troy, N. Y. One stack, 80 x 17, built in 1905-6; construction commenced July 1, 1905; furnace first blown in May 27, 1906; one Cowper-Roberts and three Gordon-Whitwell stoves; fuel, mixed anthracite coal and coke and occasionally coke alone; ores, magnetic concentrates from Northern New York; product, forge pig iron; annual capacity, 90,000 tons. Brand, "Burden." (One stack, No. 2, built in 1867, dismantled in 1904, and one stack, No. 1, built in 1865, dismantled in 1905.)—*Active in 1907.*
Annual capacity: 90,000 gross tons of forge pig iron.

ROLLING MILLS—1.

Burden Iron Works, Troy, N. Y. Founded in 1813; 42 double puddling furnaces, 12 heating furnaces, and 9 trains of rolls (four 9-inch, one 14-inch, and four 20-inch); product, bar and other merchant iron, horseshoes, and boiler rivets; annual capacity, 45,000 tons. Fuel, bituminous coal. Brands of merchant iron, "H. B. & S." and "Burden Best."
Annual capacity of the rolling mills: 45,000 gross tons.

RIVET AND HORSESHOE WORKS.

Burden Iron Works, Troy, N. Y. Product, iron rivets; sizes, from $\frac{1}{2}$ of an inch to $1\frac{1}{4}$ inches in diameter; also make horseshoes.

UNION IRON AND STEEL COMPANY.

Union Iron and Steel Company; general offices, 71 Broadway, New York. *Officer at New York:* E. L. Harper, Vice President and General Manager. *Officer at Boston:* William Rotch, President. *Officer at Big Stone Gap, Virginia:* E. L. Harper, Jr., Secretary. *Receivers:* L. O. Pettit, Big Stone Gap, Va., for Virginia, and Charles Peters, Ironton, Ohio, for Ohio. Sales made by the company and by Rogers, Brown & Co., New York and branch houses. Capital stock, \$2,000,000, of which \$1,000,000 is preferred and \$1,000,000 is common. Par value of shares, \$100. The Union Iron and Steel Company owns the following works:

BLAST FURNACES—3 COMPLETED (1 CHARCOAL AND 2 COKE) AND 1 PARTLY ERECTED (COKE).

Chatham Furnace, Chatham, N. Y. One stack, 32 x 9, built in 1873 and blown in in July, 1873; rebuilt in 1900; warm blast; open top; fuel, charcoal; ores, roasted carbonate from Amenia, New York, and Kelley, Amenia, and Shaker hematites; product, pig iron for gun castings, gun carriages, car wheels, chilled rolls, and malleable castings; specialties, pig iron for gun castings, with a tensile strength of from 30,000 to 40,000 pounds, and iron for car wheels; annual capacity, 10,000 tons. Brand, "Salisbury Chatham Charcoal Pig Iron."—*Last active in 1905.*

Union Furnace, Ironton, Ohio. One stack, 75 x 16, built in 1873-4; rebuilt in 1900 and 1904; four Player iron-pipe stoves; fuel, West Virginia coke; ore, Lake Superior; product, Bessemer, malleable, and foundry pig iron; annual capacity, 50,000 tons. Brand, "Union."—*Active in 1907.*

Union Furnace No. 1, Big Stone Gap, Virginia. One stack, 75 x 18, built in 1890-2 and blown in May 4, 1892; rebuilt in 1903; five Whitwell stoves; fuel, Pocahontas Flat Top and Wise county (Virginia) coke; ore, local fossil; product, high-grade foundry pig iron; annual capacity, 50,000 tons. Brand, "Big Stone Gap."

Union Furnace No. 2, to be 78 x 23, was partly built in 1892 and work suspended; work resumed in 1903 and again suspended.—*No. 1 active in 1907; No. 2 is partly erected and work suspended.*
Total annual capacity of the 3 completed furnaces: 110,000 tons.

THE BUFFALO UNION FURNACE COMPANY.

The Buffalo Union Furnace Company; general offices, Buffalo, N. Y.; branch offices, Cleveland, Ohio. *Officers*: D. R. Hanna, President; F. B. Richards, First Vice President; F. B. Baird, Second Vice President; C. A. Collins, Secretary; R. L. Ireland, Treasurer; M. McMurray, General Manager; and B. Marron, General Superintendent. *Selling Agents*: M. A. Hanna & Co., Cleveland.

Capital stock, \$1,200,000, of which \$200,000 is 7 per cent. cumulative preferred and \$1,000,000 is common. The Buffalo Union Furnace Company operates the blast furnaces described below:

BLAST FURNACES—3.

Furnaces A, B, and C, Buffalo, N. Y. Three stacks: Furnace A, 80 x 18, built in 1892 and first blown in February 25, 1893; one 2-pass Kennedy and three Cowper-Kennedy stoves. Furnace B, 76 x 17, built in 1897-8 and first blown in August 12, 1899; four 75 x 18 Hartman stoves. Furnace C, 60 x 15½, built in 1899-1900 and blown in on charcoal on June 18, 1901; last charcoal pig iron made August 23, 1904; fuel changed to coke in 1904 and first coke pig iron made December 6, 1904; three 60-foot 2-pass stoves and one 75 x 18 Massicks & Crooke stove. Fuel, coke; ore, Lake Superior; product, Bessemer, malleable, and foundry pig iron; annual capacity, 215,000 tons. Brand, "Buffalo."—*All active in 1907.* Total annual capacity of the 3 furnaces: 215,000 gross tons.

LUCKNOW IRON AND STEEL COMPANY.

Lucknow Iron and Steel Company; general offices, Harrisburg, Pa.; branch offices, Elmira, N. Y. *Officers*: James B. Bailey, President; Charles L. Bailey, Vice President; H. L. Champlain, Secretary and Treasurer; John E. Dougherty, Assistant Treasurer. Capital stock, \$10,000, all common. The Lucknow Iron and Steel Company leases and operates the following works:

ROLLING MILLS AND STEEL WORKS—2.

Elmira Steel Works, (leased,) Elmira, N. Y. Originally built as a rail mill in 1860; puddle mill built in 1868; rail mill converted into puddle mill in 1883; one scrap furnace, 3 busheling furnaces, 6 single and 3 double puddling furnaces, one hammer, and one 3-

high train of muck rolls. Bar mill erected in 1864; 6 coal heating furnaces and 4 trains of rolls, (one 3-high 9-inch, one 3-high 12-inch, one 2-high 18-inch, and one 3-high 22-inch.) Universal mill, built in 1884 to roll plates from 6 to 30 inches wide and of any thickness, has 2 gas heating furnaces. Annual capacity, 40,000 tons of bar, angle, and band iron and 30,000 tons of steel plates. Two 20-gross-ton basic open-hearth steel furnaces added in 1896; annual capacity, 40,000 tons of ingots. Fuel, manufactured gas and coal. Brand, "Elmira." (Owned by E. B. Leaf & Co., Philadelphia; leased by the Lucknow Iron and Steel Company on January 1, 1905.)

Glendale Mill, (leased,) Pine Iron Works P. O., Berks county, Pa. Telegraph address, Manatawny Station. Built in 1881; 2 heating furnaces, 2 trains of rolls, (one 2-high 84 x 26 and one 3-high 72 x 26-inch,) and one 100-inch Morgan shear; product, all kinds of iron and steel plates; annual capacity, 10,000 tons. Fuel, bituminous coal. Brands, "Pine" iron and "Pine" steel for the severest requirements. (Owned by the Pine Iron Works Company; leased by the Lucknow Iron and Steel Company on January 1, 1901.)

Total annual capacity of the 2 rolling mills and steel works: 40,000 gross tons of open-hearth steel ingots, 40,000 tons of bars, angles, and bands, and 40,000 tons of iron and steel plates.

BLOOMARIES—1.

Lucknow Forge, (leased,) Lucknow Station, P. R. R., 4 miles west of Harrisburg, Pa. Built in 1883 and first put in operation December 10, 1883; 10 forge fires, one heating furnace, one run-out fire, and one steam hammer; product, blooms for boiler plates, sheet iron, wire, tube, skelp, tinplates, etc., made from pig and scrap iron; annual capacity, 6,500 tons. Fuel, charcoal. (Owned by John W. Reily; leased by the Lucknow Iron and Steel Company on January 1, 1901.)

Annual capacity: 6,500 tons of charcoal blooms for boiler plates, etc.

THE RAIL JOINT COMPANY.

The Rail Joint Company; general offices, 29 West Thirty-fourth st., New York; branch selling agencies, Union Trust Building, Baltimore; India Building, Boston; Monadnock Building, Chicago; First National Bank Building, Cincinnati; Equitable Building, Denver; 29 West Thirty-fourth st., New York; Hennen Building,

New Orleans; Lewis Block, Pittsburgh; Marquam Building, Portland, Oregon; Alaska Building, Seattle, State of Washington; Commonwealth Trust Building, St. Louis; Pioneer Press Building, St. Paul, Minnesota; and Burden ave., Troy, N. Y. *Officers at New York*: Frederick T. Fearey, President; George G. Frelinghuysen, Chairman of Executive Committee; L. F. Braine and Percy Holbrook, Vice Presidents; F. C. Runyon, Treasurer; and Benjamin Wolhaupter, Secretary.

Capital stock, \$1,500,000, of which \$500,000 is preferred and \$1,000,000 is common. The Rail Joint Company was formed in October, 1905, by the consolidation of the Continuous Rail Joint Company of America, the Weber Railway Joint Manufacturing Company, and the Independent Railway Supply Company. The Rail Joint Company operates the following works:

ROLLING MILLS—1.

Albany Iron and Steel Works Department, Troy, N. Y. Established in 1819; 6 heating furnaces, one electric conveying crane, and 4 trains of rolls (one 9, one 14, and two 21-inch); product, bars, patented type continuous rail joints for T and girder rail sections for steam and electric railways, finger bars, and tram rails; annual capacity, 50,000 tons. Fuel, coal. (Formerly operated by the Continuous Rail Joint Company of America.)

Annual capacity of the rolling mills: 50,000 gross tons.

DISTRIBUTING PLANTS.

In addition to its works at Troy the company has 9 other distributing points where its patented machinery and devices are used to produce rail joints under contract with other mills, making deliveries from Buffalo, New York; New York City; Newark, New Jersey; New Castle, Delaware; Steelton and Pittsburgh, Pennsylvania; Chicago and Joliet, Illinois; and Milwaukee, Wisconsin.

PHOENIX HORSE SHOE COMPANY.

Phoenix Horse Shoe Company; general offices, Rookery Building, Chicago; branch offices, Poughkeepsie, N. Y., and Joliet, Illinois. *Officers at Chicago*: J. W. Kiser, President; A. E. Nusbaum, Treasurer; and Samuel H. Roberts, Secretary. *Officer at Poughkeepsie*: James D. Keith, Manager. *Officer at Joliet*: Thomas F. Hotchkiss, Superintendent and Purchasing Agent. The Phoenix Horse Shoe Company operates the following works:

ROLLING MILLS AND STEEL WORKS—2.

Joliet Works, Joliet, Illinois. Built in 1893 and put in operation in the same year; 2 gas regenerative and 18 heating furnaces and 4 trains of rolls (three 9 and one 3-high 20-inch); product, bars for the manufacture of horse and mule shoes; annual capacity, 18,000 tons. Fuel, coal and manufactured gas. Brand, "Phoenix."

Poughkeepsie Works, Poughkeepsie, N. Y. Built in 1873; one single puddling furnace, 2 gas and 22 coal heating furnaces, and 6 trains of rolls (four 9 and two 18-inch); product, bars for the manufacture of horse and mule shoes; annual capacity, 20,000 tons. Fuel, coal and manufactured gas. Brand, "Phoenix."

Total annual capacity of the 2 works: 38,000 gross tons of bars.

HORSE AND MULE SHOE WORKS.

Joliet Works, Joliet, Illinois. Product, horse and mule shoes.

Poughkeepsie Works, Poughkeepsie. Product, horse and mule shoes.

JOSEPH WHARTON.

Joseph Wharton; general offices, 421 Chestnut street, Philadelphia; branch offices, Wharton, N. J., for Wharton Furnaces, mines, etc., and for Wharton and Northern Railroad; Phillipsburg, N. J., for Andover Iron Company; and Coral, Indiana county, and Smithfield, Fayette county, Pa., for coal lands and coke ovens. *Selling Agents*: B. Nicoll & Co., 59 Wall st., New York. Mr. Wharton owns and operates the following blast furnaces, mines, etc.:

BLAST FURNACES—4.

Wharton Furnaces, Wharton, (formerly called Port Oram,) N. J. Three stacks: No. 1, 75 x 17, built in 1868, first blown in in 1869, remodeled in 1889, and old stack replaced by new steel shell stack in 1892; four Hartman hot-blast stoves. No. 2, 100 x 21, built in 1900-1 and first blown in August 15, 1901; four Roberts hot-blast stoves. No. 3, 100 x 21, built in 1902-3 and first blown in November 13, 1903; four Roberts hot-blast stoves. Fuel, coke and occasionally some anthracite coal mixed with coke; ores, New Jersey magnetite, Rossie hematite from St. Lawrence county, New York, and occasionally some Lake Superior hematite; product, basic, neutral foundry, and forge pig iron; total annual capacity, 300,000 tons. Brand, "Wharton." Equipped with 2 pig-iron casting machines, (one Uehling and one Weimer.) Edward Kelly, Manager.—*All active in 1907.*

Andover Iron Works, Andover Iron Company, Phillipsburg, N. J. One stack, No. 1, 85 x 17, built in 1848 and rebuilt in 1886 and 1902-3; one Siemens-Cowper-Cochrane and three Roberts stoves; fuel, coke and occasionally some anthracite coal mixed with coke; ores, magnetite from the company's mines, Rossie hematite, and Lake Superior red hematite; product, foundry, malleable, basic, and forge pig iron; annual capacity, from 60,000 to 70,000 tons. Brand, "Andover." Joseph Wharton, President and Treasurer, and L. B. Allison, Secretary, 421 Chestnut st., Philadelphia; Edward Kelly, Manager, Wharton, N. J. All the stock of the Andover Iron Company is owned by Joseph Wharton. The company organization remains.—*Active in 1907.*

Total annual capacity of the 4 furnaces: about 370,000 gross tons.

FOUNDRIES AND MACHINE SHOPS.

Iron and brass castings are made at Wharton for the use of the Wharton Furnaces, the mines, and the Andover Iron Works. Machine shops are connected with the Wharton and Andover Furnaces, doing all ordinary repairs; also much new work.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

Mr. Wharton owns about 5,000 acres of iron-ore lands near Wharton, N. J., where he operates the Hurd, Andover, and Hibernia mines; the Orchard, Teabo, Allen, Byram, Scrub Oaks, and Baker mines are held in reserve. He also owns and operates the Rossie iron-ore mine near Spragueville, N. Y. These mines now have an annual production of about 300,000 tons of iron ore, which may be doubled when needed. Connected with the Hibernia and other mines are three plants for magnetically concentrating iron ore. He now owns not only the entire Hibernia vein for its full length of about three miles but also all the parallel veins for about five miles from the Dickerson mine on the southwest to the Mount Hope mine on the northeast, except the famous Richard mine of the Thomas Iron Company and about 1,000 feet of doubtful value. This vein as now worked in the Hurd mine is about 20 feet thick of 62 per cent. magnetite and for a length of a mile averages less than half a mile from the Wharton Furnaces. The total of available magnetite ores owned near Wharton has been computed at over 30,000,000 tons. The hematite at Rossie has been estimated at double that quantity.

Mr. Wharton also owns about 7,500 acres of coal lands in Indiana and Fayette counties, Pa. He also owns a tract of 24,600 acres of undeveloped coal lands in West Virginia on the Pond Fork of Coal river, a branch of the Kanawha river. He owns and oper-

ates 300 bee-hive coke ovens at Coral, Indiana county, Pa., and 86 bee-hive ovens at Smithfield, Fayette county, Pa. These ovens have an annual capacity of about 200,000 net tons of coke. His coal lands in Indiana county supply the coal needed for his iron-ore mines, etc., and he also mines coal for sale. He has a general store at Coral. He owns nearly 600 dwelling houses at or near Hibernia, Wharton, Coral, and Rossie.

Mr. Wharton also owns the Wharton and Northern Railroad, extending from junctions with the Central Railroad of New Jersey and the Delaware, Lackawanna, and Western Railroad on the south to the New York, Susquehanna, and Western Railroad on the north, with a branch to the mines on Hibernia Hill. The Wharton and Northern Railroad Company was formed to combine the Morris County Railroad Company, the Morris County Connecting Railroad Company, the Port Oram Railroad Company, and the Hibernia Branch Railroad Company, which have about 23 miles of track exclusive of yard tracks. This company carries the magnetic ores from Mr. Wharton's Hibernia mines to the furnaces at Wharton. It operates 6 locomotives and sundry freight, road, and other cars. Traffic is mainly carried on cars owned by connecting railroads.

The Hibernia Underground Railroad, which also belongs to Mr. Wharton, runs from near the foot of Hibernia Hill about $1\frac{1}{2}$ miles in or near the ore vein, carries out ore by two narrow-gauge locomotives to a magnetic separator, and also drains the entire vein to the depth of 350 feet from the surface.

The Andover Iron Company owns 20 acres of limestone lands adjoining its furnace plant at Phillipsburg, New Jersey, which yield an annual production of about 40,000 tons of limestone. This production may be quadrupled if the limestone is needed.

THE NEW JERSEY ZINC COMPANY.

The New Jersey Zinc Company; general offices, 71 Broadway, New York. *Officers at New York:* Stephen S. Palmer, President; William P. Hardenbergh, Vice President; A. P. Cobb, Secretary; H. S. Wardner, Treasurer; and L. R. Lemoine, General Manager. *Officer at Palmerton, Pa.:* George G. Convers, General Superintendent. All sales made by the company.

Capital stock, \$10,000,000, all common. The New Jersey Zinc Company operates or controls the following plants, including the plants owned by the New Jersey Zinc Company (of Pa.):

BLAST FURNACES—2.

Newark Furnaces, Newark, N. J. Two stacks: Furnace A, 31 x 8, built in 1885 to take the place of two stacks built in 1855 and 1863; one 21 and one 24-pipe Cooper-Durham stoves. Furnace B, 50 x 12, built in 1883 to take the place of a stack built in 1871; rebuilt in 1896; three 24-pipe Cooper-Durham stoves. Fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; total annual capacity, 18,000 tons. Also operate a zinc oxide plant and repair shops.—*One furnace active in 1907.*

Total annual capacity of the 2 furnaces: 18,000 tons of spiegeleisen.

THE NEW JERSEY ZINC COMPANY (OF PA.).

The New Jersey Zinc Company (of Pa.); general offices, South Bethlehem, Pa. *Officers at South Bethlehem:* S. S. Palmer, President; A. P. Cobb, Secretary; H. S. Wardner, Treasurer; and L. R. Lemoine, General Manager. *Officer at Palmerton, Pa.:* George G. Convers, General Superintendent. *Selling Agents:* The New Jersey Zinc Company, 71 Broadway, New York.

Capital stock, \$700,000, all controlled by the New Jersey Zinc Company. The New Jersey Zinc Company (of Pa.) operates the blast furnaces and other plants described below:

BLAST FURNACES—3.

Palmerton Furnaces, Palmerton, Pa. Telegraph address, Hazard, Carbon county, Pa. Two stacks: No. 1, 60 x 14, built in 1901-3; construction commenced in July, 1901, and first blown in April 5, 1904; five 32-pipe Cooper-Durham stoves. No. 2, 70 x 14, built in 1905-6; construction commenced on October 16, 1905, and first blown in September 3, 1906; four Kennedy fire-brick stoves. Fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; total annual capacity, 40,000 tons. Connected with the furnaces are repair shops, a foundry for making gray iron castings for the use of the company, and plants for the manufacture of zinc oxide, spelter, sulphuric acid, and lithopone.—*Both active in 1907.*

South Bethlehem Furnace, South Bethlehem, Pa. One stack, 35 x 9, first put in blast in February, 1882; two Durham stoves; fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; annual capacity, 5,400 tons. Repair shops, a foundry for making gray iron castings for the use of the company, and plants for the manufacture of zinc oxide and spelter are connected with this furnace.—*Active in 1907.*

Total annual capacity of the 3 furnaces: 45,400 tons of spiegeleisen.

JOHN A. ROEBLING'S SONS COMPANY.

John A. Roebling's Sons Company; general offices, 612 South Broad st., Trenton, N. J.; branch offices, 117 Liberty st., New York; 829 Superior ave., Cleveland; 173 Lake st., Chicago; 202 Second st., (temporary offices,) San Francisco (building warehouse and permanent offices at corner of Folsom and Hawthorn sts., which will be ready for occupancy early in 1908); 900 First ave. South, Seattle, State of Washington; Market and Alameda sts., Los Angeles, Cal.; and 91 First st., Portland, Oregon. *Officers:* Charles G. Roebling, President; Washington A. Roebling, Vice President; and Ferdinand W. Roebling, Secretary and Treasurer.

Capital stock, \$250,000, all common. The John A. Roebling's Sons Company operates the following rolling mills and steel works:

ROLLING MILLS AND STEEL WORKS—2.

Kinokora Works, Roebling, Burlington county, N. J. Construction commenced in the summer of 1905; when entirely completed the works will contain four 30-gross-ton Siemens stationary open-hearth steel furnaces, (2 acid and 2 basic,) with an annual capacity of 50,000 tons of acid ingots and 50,000 tons of basic ingots, one 26-inch blooming mill with 4 heating furnaces, and one continuous breaking down train and looping rolls with 3 continuous heating furnaces. The works will also be equipped with machinery for drawing iron, steel, and copper wire. When these works are completed and the modified Garrett wire-rod mill now in the company's plant at Trenton is installed the product will be ingots, 4-inch billets, steel and copper wire rods, and iron, steel, and copper wire; annual capacity, 100,000 tons of open-hearth ingots, 150,000 tons of steel wire rods partly rolled from purchased billets, and 75,000,000 pounds of copper rods. Fuel, manufactured gas and coal. The wire-drawing, wire-rope, wire-cable, etc., departments of the Trenton Works will not be removed.—*The rolling mill department at Roebling was partly put in operation on November 16, 1906; acid open-hearth steel was first made on March 12, 1907, and basic steel on April 26, 1907.*

Trenton Works, Trenton, N. J. Established in 1852; rolling mill rebuilt in 1873 and in 1887 and now used only for rolling wire rods; it is a modified Garrett mill and has 3 Siemens gas heating furnaces; annual capacity, 45,000 tons of steel and copper rods. When the works which the company is erecting at Roebling are completed and in operation the wire-rod mill at the

Trenton Works will be removed to Roebling and re-erected there. In addition to wire rods the works at Trenton also manufacture iron and steel wire, wire rope, wire cables, wire cloth, barb wire, copper wire, and insulated wire and cables. Fuel, manufactured gas and coal.

Total annual capacity of the 2 works: 100,000 gross tons of open-hearth steel ingots, 150,000 tons of steel wire rods partly rolled from purchased billets, 75,000,000 pounds of copper rods, 150,000 tons of iron and steel wire, and 35,000 tons of copper wire.

WIRE, WIRE-ROPE, WIRE-CABLE, AND OTHER WORKS.

At its Trenton Works the company draws iron, steel, and copper wire; makes wire rope, wire cables, wire cloth, barb wire, insulated wire and cables, etc.; number of wire-drawing blocks, 7,811; annual capacity, 30,000 tons of iron and steel wire and 35,000 tons of copper wire.

At its Kinkora Works the company is erecting a plant for drawing iron, steel, and copper wire.—*The wire-drawing plant will probably be ready for operation in the fall of 1907.*

AMERICAN BRAKE SHOE AND FOUNDRY COMPANY.

American Brake Shoe and Foundry Company; general offices, Mahwah, N. J.; branch offices, 170 Broadway, New York, and Western Union Building, Chicago. *Officers at Mahwah:* W. W. Snow, Chairman of the Board of Directors; Otis H. Cutler, President; Joseph D. Gallagher, First Vice President; Joseph B. Terbell, Second Vice President; and Henry C. Knox, Secretary and Treasurer.

Capital stock, \$5,090,000, of which \$3,000,000 is 7 per cent. cumulative preferred and \$2,090,000 is 4 per cent. common. The company owns or controls the following works, which are equipped for the manufacture of brake shoes, Tropenas and manganese steel castings, crucible cast-steel inserts, gray iron castings, etc. Brake shoes are also manufactured under license by the Griffin Wheel Company at Chicago, Detroit, Denver, and Tacoma.

IRON AND STEEL FOUNDRIES—5.

Buffalo Works, Buffalo, N. Y. Product, gray iron and patented brake shoes; annual capacity, 20,000 tons.

Chattanooga Works, Chattanooga, Tennessee. Product, gray iron and patented brake shoes; annual capacity, 15,000 tons.

Chicago Heights Works, Chicago Heights, Illinois. Built in 1899-1900; three 2-gross-ton Tropenas steel converters and 2 cupolas; first steel made April 2, 1900; product, brake shoes and miscellaneous steel castings; also manganese steel castings; annual capacity, 8,000 tons. Crucible steel department added in 1901; first crucible steel made February 4, 1901; one 6-hole crucible steel-melting furnace; number of pots, 30; product, crucible cast-steel inserts for brake shoes; annual capacity, 1,000 tons. Fuel, coke. A gray iron foundry is connected with the works; product, brake shoes and miscellaneous castings; annual capacity, 18,000 tons.

Mahwah Works, Mahwah, N. J. Original works built in 1900; one crucible steel-melting furnace with four 4-pot holes added in 1906; first steel made July 13, 1906; product, crucible cast-steel inserts for brake shoes; annual capacity, 500 tons. Fuel, coke. A gray iron foundry is connected with the works; product, patented brake shoes and miscellaneous castings; annual capacity, 50,000 tons.

Uniontown Works, Uniontown, Pa. Product, gray iron and patented brake shoes; annual capacity, 20,000 tons.

Total annual capacity of the 5 works: 8,000 tons of Tropenas and manganese steel castings, 1,500 tons of crucible steel inserts, and 123,000 tons of gray iron and patented brake shoes and castings.

AMERICAN McKENNA PROCESS COMPANY.

American McKenna Process Company; general offices, Colby-Abbot Building, Milwaukee, Wisconsin; branch offices, 14 Beacon st., Boston. *Officers:* Howard Morris, President; Charles M. Morris, Secretary; and E. J. Tapping, Treasurer and General Manager. The company owns or operates the following works:

ROLLING MILLS—3.

Joliet Plant, (owned,) Joliet, Illinois. Built in 1897 and first put in operation August 11, 1897; two 12 x 35-foot heating furnaces and 3 trains of rolls (one 12 and two 24-inch, arranged tandem); product, renewed steel rails by the McKenna process; annual capacity, 100,000 tons. Fuel, bituminous coal.

Kansas City Plant, (leased,) Kansas City, Kansas. Built in 1898 and first put in operation August 16, 1898; two 12 x 35-foot heating furnaces and 3 trains of rolls (one 12 and two 24-inch, arranged tandem); product, renewed steel rails by the McKenna process; annual capacity, 100,000 tons. Fuel, bituminous coal. (Owned and formerly operated by the McKenna Steel Working Company.)

Tremley Point Plant, (owned,) Tremley Point, N. J. Built in 1901-3 and first put in operation in 1903; 3 heating furnaces (36 feet 6 inches long) and 3 trains of rolls (one 12 and two 30-inch) for renewing old steel rails; first renewed steel rails rolled in September, 1903; annual capacity, 180,000 tons. Fuel, coal.
Total annual capacity: 380,000 gross tons of renewed steel rails.

HENRY DISSTON & SONS, (INCORPORATED.)

Henry Disston & Sons, (Incorporated;) general offices, Tacony, Philadelphia. Address communications to post-office box 1537, Philadelphia. Branch offices: 112 Pearl st., Boston; Sixth and Baymiller sts., Cincinnati; Washington and Jefferson sts., Chicago; 209 South Main st., Memphis, Tennessee; 404 Carondelet st., New Orleans; Brannan st., near Sixth st., San Francisco; and 112 Adelaide st. East, Toronto, Canada. *Officers:* William Disston, President; Henry Disston, Vice President; Samuel Disston, Secretary and General Manager; Jacob S. Disston, Treasurer; and Robert J. Johnson, Assistant Treasurer.

Capital stock, \$3,000,000, all common. Par value, \$100 per share. This company manufactures circular, cross-cut, hand, and other varieties of saws, and makes saw-fitting tools, plumbs, levels, bevels, squares, brick and plastering trowels, etc., etc. It has an annual capacity of about 450,000 cross-cut saws, 100,000 circular saws from 6 inches in diameter, and 47,000 band saws. It also acts as selling agents for the Henry Disston and Sons Iron and Steel Works and the Henry Disston and Sons File Company.

HENRY DISSTON AND SONS IRON AND STEEL WORKS.

Henry Disston and Sons Iron and Steel Works; general offices, Tacony, Philadelphia. Address communications to post-office box 1537, Philadelphia. Branch offices: Boston, Cincinnati, Chicago, Memphis, Tennessee, New Orleans, San Francisco, and Toronto, Canada. *Officers:* William Disston, President; Henry Disston, Vice President; Samuel Disston, Secretary and General Manager; Jacob S. Disston, Treasurer; and Robert J. Johnson, Assistant Treasurer. *Selling Agents:* Henry Disston & Sons, (Incorporated.)

Capital stock, \$1,250,000, all common. Par value of stock, \$100 per share. The Henry Disston and Sons Iron and Steel Works operate the following plants:

ROLLING MILLS AND STEEL WORKS—1.

Keystone Saw, Tool, Steel, and File Works, Tacony, Philadelphia. Manufacture of saws started in 1840 and steel in 1854; one 30, two 36, and three 24-pot crucible steel-melting furnaces; first rolling mill built in 1866; 8 trains of hot rolls, (one 9 and one 12-inch guide, one 18-inch bar and band, two 16, one 18, and one 20-inch sheet, and one 28-inch plate,) 10 cold rolling mills, (one 20 x 20, one 16 x 24, five 10 x 12, and three 8 x 4½-inch,) 4 drawing blocks for fine wire, one gas and 26 coal heating and annealing furnaces, 4 oil annealing, hardening, and tempering furnaces, 4 hammers, (one 4,500-pound, one 3,000-pound, one 1,100-pound, and one 750-pound,) and one 10-gross-ton basic open-hearth steel furnace. The open-hearth furnace was added in 1900 and first steel made October 3, 1900. An experimental furnace for making steel by electricity is also connected with the works. Adding one 9-inch bar mill, to be completed in December, 1907.

Product, principally saw steel of every description, engravers' plates, bar tool steel, cold-rolled bands, flat wire, and special steel. The product of the 18-inch train for band saws and the 9 and 12-inch guide mills is bar and band steel of all kinds. Fuel, coal and manufactured gas. Brand, "Disston."

Total annual capacity: 12,000 gross tons of crucible steel ingots, 4,000 tons of open-hearth steel ingots, 20,000 tons of bars, bands, and rods, and 7,000 tons of sheet steel and saw plates.

HENRY DISSTON AND SONS FILE COMPANY.

Henry Disston and Sons File Company; general offices, Tacony, Philadelphia. Address communications to post-office box 1537, Philadelphia. Branch offices: Boston, Cincinnati, Chicago, Memphis, Tennessee, New Orleans, San Francisco, and Toronto, Canada. *Officers*: William Disston, President; Henry Disston, Vice President; Samuel Disston, Secretary and General Manager; Jacob S. Disston, Treasurer; and Robert J. Johnson, Assistant Treasurer. *Selling Agents*: Henry Disston & Sons, (Incorporated.)

Capital stock, \$500,000, all common. Par value, \$100 per share. The company manufactures files of all shapes, sizes, and kinds of cuts.

AMERICAN STEEL FOUNDRIES.

American Steel Foundries; general offices, Commercial National Bank Building, Chicago. *Officers*: Charles Miller, Chairman Board

of Directors ; William V. Kelley, President ; R. P. Lamont, First Vice President ; W. W. Butler, Second Vice President ; G. E. Scott, Third Vice President ; R. H. Ripley, Fourth Vice President ; F. E. Patterson, Secretary and Treasurer ; A. Bentley, Comptroller ; and T. E. Moritz, Purchasing Agent.

Sales Agencies: Commercial National Bank Building, Chicago ; 42 Broadway, New York ; and Frisco Building, St. Louis.

Capital stock, \$40,000,000, of which \$20,000,000 is 6 per cent. cumulative preferred and \$20,000,000 is common. Capital stock issued, \$17,700,000 of preferred and \$17,700,000 of common. The American Steel Foundries operate the following works :

STEEL-CASTING PLANTS—8.

Alliance Works, Alliance, Ohio. Built in 1883 and since enlarged ; four 30-gross-ton basic open-hearth steel furnaces ; product, open-hearth steel car couplers and general steel castings ; annual capacity, 30,000 tons. Fuel, producer gas.

East St. Louis Works, East St. Louis, Illinois. Built in 1900 ; five Wellman-Seaver patent rolling basic open-hearth furnaces (four 15 and one 20-gross-ton) ; first steel made June 14, 1900 ; product, car trucks, car bolsters, pilot couplers, and other steel castings ; annual capacity, 50,000 tons. Fuel, oil.

Franklin Works, Franklin, Pa. Built in 1895 ; two 15-gross-ton Siemens acid open-hearth steel furnaces ; first steel made in December, 1895 ; product, miscellaneous steel castings up to 60,000 lbs. ; annual capacity, 12,000 tons. Fuel, natural and producer gas.

Granite City Works, Granite City, Illinois. Five 25-gross-ton modified Siemens basic open-hearth steel furnaces built in 1894 and 1898 ; first open-hearth steel made in November, 1894 ; product, railway and other large steel castings ; annual capacity, 60,000 tons. Fuel, oil.

Indiana Harbor Works, Indiana Harbor, Indiana. Construction commenced in September, 1903 ; first acid steel made June 29, 1904, and first basic steel made December 7, 1904 ; plant now contains two Siemens 20-gross-ton acid open-hearth steel furnaces ; machinery, etc., of abandoned works at Fifty-ninth and Wallace sts., Chicago, used in part in equipping the plant ; product, knuckles and locomotive, car, and other steel castings ; annual capacity, 25,000 tons. Fuel, oil.

Pittsburgh Works, corner Thirty-sixth street and Allegheny Valley Railway, Pittsburgh. Built in 1889 ; one 30-pot crucible steel-melting furnace ; first steel made in September, 1889. Open-hearth steel plant added in 1895 ; one 10-gross-ton acid furnace. Product, crucible and open-hearth steel castings from one to 20,000

lbs.; specialty, small castings; annual capacity, 7,500 tons. Fuel, natural gas.

Sharon Works, Sharon, Pa. Built in 1887 and first steel made August 26, 1887; one 30 and two 25-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings of all kinds; annual capacity, 25,000 tons. Fuel, producer gas.

Thurlow Works, Thurlow, (post-office address, Chester,) Pa. Built in 1883-4 and first put in operation in March, 1884; enlarged in 1890 and 1893; two 12-gross-ton and two 20-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings; annual capacity, 25,000 tons. Fuel, producer gas.

Total annual capacity of the 8 plants: 234,500 gross tons of railroad and miscellaneous open-hearth and crucible steel castings.

RAILWAY APPLIANCE WORKS.

Simplex Railway Appliance Company, Hammond, Indiana. Built in 1897; product, railway car bolsters, brake beams, coil and elliptic springs, car and locomotive springs, roller side bearings, etc. (All the capital stock of the Simplex Railway Appliance Company is owned by the American Steel Foundries.)

EMPIRE STEEL AND IRON COMPANY.

Empire Steel and Iron Company; general offices, Catasauqua, Pa.

Officers: Leonard Peckitt, President; James W. Fuller, Vice President; J. S. Stillman, Secretary and Treasurer; and H. S. Hart, Auditor.

Selling Agents: Rogers, Brown & Co., New York, Buffalo, Cincinnati, Cleveland, Pittsburgh, Chicago, Philadelphia, Boston, and Birmingham.

Authorized capital, \$5,000,000, divided as follows: \$2,500,000 of preferred 6 per cent. cumulative and \$2,500,000 of common stock; issued, \$2,500,000 of preferred and \$2,281,400 of common stock. No bonds have been issued by the company. The Empire Steel and Iron Company operates or controls the following works:

BLAST FURNACES—8.

Crane Furnaces, Crane Iron Works, Catasauqua, Pa. Original furnaces built in 1839, 1842, and 1846; first iron made July 4, 1840. Present plant consists of three stacks: C No. 1, 77½ x 17½, built in 1839, blown in July 3, 1840, and rebuilt in 1901, has three Cowper stoves; D No. 3, 75½ x 17, built in 1846 and rebuilt in 1880, has three Cowper stoves; and A No. 5, 61 x 16, built in 1850 and

rebuilt in 1877, has three Whitwell stoves; fuel, anthracite coal and coke; ores, New Jersey magnetic, Pennsylvania hematite, Lake Superior, and foreign; product, foundry, basic open-hearth, Bessemer, and low-phosphorus pig iron; total annual capacity, 134,000 tons. Brands, "Crane," "Crane L. P.," and "Crane Basic." Leonard Peckitt, President; J. S. Stillman, Secretary; H. S. Hart, Treasurer. (Operated by the Crane Iron Works; controlled by the Empire Steel and Iron Company. Furnace E No. 6, 60 x 16, dismantled in 1904.)—*All active in 1907.*

Henry Clay Furnaces, Reading, Pa. Two stacks, each 57 x 13, one built in 1842 and blown in in August, 1844, and the other built in 1855 and blown in in September, 1856; rebuilt several times; repaired in 1902; two Gordon-Whitwell fire-brick stoves, each 60 x 16, and three fire-brick stoves, each 60 x 17; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, foundry and forge pig iron; total annual capacity, 45,000 tons. Brand, "Henry Clay."—*Both active in 1907.*

Macungie Furnace, Macungie, Pa. One stack, 56 x 16, completed in 1874 and blown in September 14, 1874; repaired in 1902; old pattern Kent stoves; fuel, anthracite coal and coke; ores, Lake Superior and native hematite; product, Bessemer, foundry, and forge pig iron; annual capacity, 25,000 tons. Brand, "Macungie."—*Active in 1907.*

Oxford Furnace, Oxford, N. J. One stack, 63 x 17½, built in 1871, remodeled in 1900, and repaired in 1902 and 1905; two Kent and two Durham iron-pipe ovens; fuel, anthracite coal and coke; ore, magnetic mined near the furnace; product, basic, foundry, and forge pig iron; annual capacity, 36,000 tons. Brand, "Oxford."—*Active in 1907.*

Topton Furnace, Topton, Pa. One stack, 70 x 16, built in 1873, remodeled in 1888, rebuilt in 1892, and repaired in 1902; three Gordon fire-brick stoves; fuel, anthracite coal and coke; ores, Lake Superior and native hematite; product, foundry and forge pig iron; annual capacity, 36,000 tons. Brand, "Topton."—*Active in 1907.*

Total annual capacity of the 8 furnaces: 276,000 gross tons.

IRON-ORE AND COAL LANDS, COKE OVENS, ETC.

The company owns at Oxford, N. J., about 2,500 acres of iron-ore lands and controls the mineral rights for several thousand additional acres. It has also purchased the iron-ore property of the Mount Hope Mining Company in New Jersey, containing in all about 1,500 acres of land. In addition it owns iron-ore mines at Wheatfield, near Reading, Pa.

The company also controls and operates the Mount Hope Mineral Railroad, $4\frac{1}{8}$ miles long, which connects the Mount Hope iron-ore mines with the Central Railroad of New Jersey and the Delaware, Lackawanna, and Western Railroad at Wharton, N. J. With the Alleghany Ore and Iron Company it also jointly controls the Victoria Coal and Coke Company, which owns and operates coal mines and coke ovens at Caperton, West Virginia. (For a description of the properties of this company see page 195.)

THE THOMAS IRON COMPANY.

The Thomas Iron Company; general offices, Easton, Pa.; branch offices, Hokendauqua, Alburtis, Island Park, and Hellertown, Pa., and Richard Mine, Wharton, N. J. *Officers at Easton:* B. F. Fackenthal, Jr., President and General Manager; W. H. Hulick, Vice President; James W. Weaver, Secretary and Treasurer; and David H. Thomas, General Superintendent.

Sales Agents: W. R. Thomas, 95 Liberty st., New York, and Philip E. Wright, 626-29 Stephen Girard Building, Philadelphia. Sales are also made at the main offices of the company at Easton.

Capital stock, \$2,500,000, all common. There is no bonded indebtedness. The Thomas Iron Company operates the blast furnaces, railroads, ore mines, and other properties described below:

BLAST FURNACES—9.

Hokendauqua Furnaces, Hokendauqua, Pa. Four stacks: No. 1, 80 x 17, built in 1855 and rebuilt in 1894; No. 3, 80 x 17, built in 1863 and rebuilt in 1899; and Nos. 5 and 6, each 60 x 17, built in 1873; Nos. 1, 3, and 6 have Taws & Hartman regenerative stoves; No. 5 has Durham iron-pipe stoves; fuel, mixed anthracite coal and coke; total annual capacity, 164,000 tons. The annual capacity of Nos. 1 and 3 will be considerably increased in 1907.—*All active in 1907.*

Keystone Furnace, (Island Park,) Easton, Pa. One stack, No. 9, 65 x 16, first put in blast April 17, 1876; Siemens-Cowper-Cochrane regenerative stoves; fuel, mixed anthracite coal and coke; annual capacity, 26,000 tons.—*Active in 1907.*

Lock Ridge Furnaces, Alburtis, Pa. Two stacks: No. 7, 60 x 14, built in 1867; No. 8, 60 x 16, built in 1869; No. 7 has Durham iron-pipe stoves and No. 8 has Thomas pipe stoves; fuel, anthracite coal; total annual capacity, 35,000 tons.—*Both active in 1907.*

Saucon Furnaces, Hellertown, Pa. Two stacks: No. 10, 75 x 16,

put in blast March 25, 1868, and rebuilt in 1894; No. 11, 60 x 16, put in blast May 25, 1870; Durham iron-pipe stoves; fuel, mixed anthracite coal and coke; total annual capacity, 55,000 tons.—*Both active in 1907.*

Ores, foreign, Lake Superior, local brown hematite, and New Jersey magnetite; product, foundry, forge, basic open-hearth, and Bessemer pig iron. Brand, "Thomas."

Total annual capacity of the 9 furnaces: 280,000 gross tons.

RAILROADS AND LIMESTONE QUARRIES.

The Thomas Iron Company owns the entire capital stock of the Ironton Railroad Company and the Saucon Valley Railroad Company; also two-fifths of the capital stock of the Catasauqua and Fogelsville Railroad Company and one-third of the capital stock of the Mount Hope Mineral Railroad Company in New Jersey. It also owns and operates the following limestone quarries: the Saeger quarry, on the Ironton Railroad, and the Best quarry, at Island Park, and the Biery quarry, at Hokendauqua, on the Lehigh Valley Railroad. In addition it leases and operates the Eberhart quarry, at Catasauqua, the Lobach quarry, on the Ironton Railroad, the Riegel, Grim, and Wagner quarries, at Hellertown, and the Spring Creek and Ruth quarries, at Alburtis. The annual limestone capacity of all the quarries is about 200,000 gross tons.

IRON-ORE MINES.

The company also owns the Richard iron-ore mine, at Wharton, N. J., with an annual capacity of 100,000 tons, and twelve other iron-ore properties in Lehigh and Berks counties, Pennsylvania.

ALAN WOOD IRON AND STEEL COMPANY.

Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia.

Officers: Howard Wood, President; Richard G. Wood, Vice President; Jonathan R. Jones, Secretary and Treasurer; and W. W. Lukens, Assistant Secretary and Assistant Treasurer. Sales made by the company.

Capital stock, \$3,500,000, of which \$500,000 is 8 per cent. cumulative preferred and \$3,000,000 is common. The Alan Wood Iron and Steel Company owns and operates the following works:

ROLLING MILLS AND STEEL WORKS—2.

Ivy Rock Steel Works, Ivy Rock, about one mile north of Conshohocken, Pa. Built in 1902-3; nine 50-gross-ton Siemens basic

open-hearth steel furnaces, 4 sets of 4-hole soaking pits, and 41 gas producers; first open-hearth steel made May 31, 1903; product, steel ingots; annual capacity, 230,000 tons. One 28-inch blooming and one 42-inch universal interchangeable mill; first billets and first universal plates rolled in June, 1903; product, steel billets, bars, and universal plates; annual capacity, 200,000 tons. Fuel, coal and producer gas. Brand, "AW." A machine shop is connected with the works.

Schuylkill Iron Works, Conshohocken, Pa. Business established in 1826; works built in 1858; 9 double puddling furnaces, 8 flue, 4 bar, 4 sheet, and 6 annealing furnaces, 11 trains of rolls, (two 26 x 72 and two 24 x 54-inch 3-high plate, one 22 x 48, two 22 x 42, and one 20 x 42-inch 2-high sheet, one 20-inch 3-high bar with 3 stands, one 19-inch 2-high bar with one stand, and one 22 x 42-inch 2-high cold,) and one 5-ton hammer; product, muck bar and sheet, plate, and flue iron and steel; annual capacity, 11,000 tons of muck bar, 15,000 tons of bar iron and steel, 5,000 tons of sheet iron and steel, and 30,000 tons of flue and plate iron and steel. Fuel, anthracite and bituminous coal, coke, and manufactured gas. Brand, "AW." A machine shop is connected with the works.

Total annual capacity of the 2 rolling mills and steel works: 230,000 gross tons of open-hearth steel ingots, 200,000 gross tons of steel billets, bars, or universal plates, 11,000 tons of muck bar, 15,000 tons of bar iron and bar steel, 5,000 tons of sheet iron and steel, and 30,000 tons of flue and plate iron and steel.

THE PHOENIX IRON COMPANY.

The Phoenix Iron Company; general offices, 410 Walnut st., Philadelphia; branch offices, 49 William st., New York; 110 State st., Boston; Continental Trust Building, Baltimore; and Rookery Building, Chicago. *Officers at Philadelphia:* David Reeves, President; George Gerry White, Secretary; George C. Carson, Jr., Treasurer; A. H. Cordery, Sales Agent; and D. A. Clarke, Purchasing Agent. *Officers at Phoenixville, Pa.:* William H. Reeves, Vice President and General Superintendent, and Frank P. Norris, Manager. *Sales Offices:* Sales are made at the general offices and at all branch offices.

Capital stock, \$1,500,000, of which \$800,000 is 7 per cent. cumulative preferred and \$700,000 is common. The Phoenix Iron Company operates the following rolling mills, steel works, etc.:

ROLLING MILLS AND STEEL WORKS—1.

Phoenix Iron Works, Phoenixville, Pa. Original works built in 1790; enlarged in 1809; new mill built in 1873; 16 Siemens heating furnaces, one Siemens and 19 Phoenix gas producers, and 5 trains of rolls (one 9, one 13, two 22, and one 24-inch); the 24-inch train of rolls is driven by a pair of Macintosh & Hemphill 28 x 48-inch reversing engines of the latest design; all material is put in and drawn from the furnaces by a Wellman-Seaver Engineering Company's patent electric charging machine and transfer buggy; also handled at rolls by electrically driven tables designed by the same company; product, open-hearth steel bars, beams, channels, angles, tees, miscellaneous structural shapes, and steel castings; annual capacity, 200,000 tons. Fuel, bituminous coal.

Steel Works built in 1888-9 and enlarged in 1899 and 1906; three 40 and three 50-gross-ton basic and two 60-gross-ton acid open-hearth steel furnaces with an annual capacity of 150,000 tons of basic ingots and 50,000 tons of acid ingots; plant equipped with 2 Wellman-Seaver Engineering Company's patent electric charging machines, 2 Alliance Machine Company's patent overhead traveling electric ladle cranes of 100 tons' capacity each, one Morgan Engineering Company's patent electric ingot stripper, and 14 Siemens and 2 Duff gas producers; also one 36-inch blooming mill, driven by a pair of Macintosh & Hemphill 33 x 48-inch reversing engines, and four 4-hole soaking pits. First steel made in February, 1889. Fuel, bituminous coal.

Total annual capacity of the rolling mills and steel works: 200,000 gross tons of open-hearth steel ingots and 200,000 tons of open-hearth steel bars, beams, channels, other shapes, and castings.

BRIDGEBUILDING WORKS AND FOUNDRY DEPARTMENT.

Phoenix Bridge Works, Phoenixville. Product, railroad and highway bridges; also erect iron and steel buildings; annual capacity, 75,000 tons. An eyebar plant, making bars from 3 inches to 16 inches inclusive in width, is connected with the works; also a hydraulic testing machine with a capacity of 2,000,000 pounds.

Phoenix Foundry, Phoenixville, Pa. Product, all kinds of heavy gray iron and open-hearth steel castings; annual capacity, 6,000 gross tons of iron and 2,500 gross tons of steel castings.

BOLT, NUT, RIVET, AND STEEL FORGING WORKS.

Phoenix Bolt, Nut, and Rivet Works, Phoenixville, Pa. Product, bolts, nuts, and rivets, all consumed by the company; sizes, from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches inclusive.

Phoenix Forge Works, Phoenixville, Pa. Product, forged steel eye-bars, forged steel rounds, etc.; annual capacity, 8,000 tons.

IRON-ORE AND LIMESTONE LANDS.

The company owns 1,330 acres of iron-ore lands in Chester, Montgomery, Berks, and Lancaster counties, Pennsylvania. It also owns 15 acres of limestone lands at Port Kennedy, Pennsylvania.

GLASGOW IRON COMPANY.

Glasgow Iron Company; general offices, Pottstown, Pa.; branch offices, Harrison Building, Philadelphia. *Officers at Pottstown:* Comly B. Shoemaker, President; Robert Shoemaker, Jr., Vice President; Harry W. Prizer, Secretary; Oliver E. Shuler, Treasurer; and James P. Roe, General Superintendent. *Sales Offices:* 88 Washington st., New York, and 272 Franklin st., Boston, Mass. Capital stock authorized, \$500,000; paid in, \$360,000. The Glasgow Iron Company operates or leases the following plants:

BLAST FURNACES—1 LEASED AND SUBLET.

Anvil Furnace, (leased,) Pottstown, Pa. One stack, 80 x 17, built in 1867. (Owned by the Pottstown Iron Company.)—*This furnace has been sublet to the Warwick Iron and Steel Company. For description see Blast Furnaces in the Schuylkill Valley, Part II.*

ROLLING MILLS AND STEEL WORKS—1 OWNED AND 1 LEASED.

Glasgow Iron and Steel Works, (owned,) Ninth ward, Pottstown, Pa. Puddle mill built in 1874; 8 double puddling furnaces, one train of muck rolls, and one rotary squeezer; steam and water power; annual capacity, 10,000 tons of muck bar. Plate Mill No. 1 built in 1875; 3 heating furnaces and one train of rolls 96 inches long; annual capacity, 12,000 tons of steel plates. Plate Mill No. 2 completed in 1889; 2 large gas heating furnaces, one train of rolls, and rotary shears; annual capacity, 12,000 tons of iron and steel plates; complete flanging and dishing plant and plant for making buckled plates connected with this mill. Product, muck bar, iron and steel bridge, tank, and boiler plate, flanged and dished boiler heads, manholes, manhole saddles for boilers, pressed steel boiler lugs, pipe flanges, etc., and buckle plates. Fuel, manufactured gas and coal.

Pottstown Iron Works, (leased,) Pottstown, Pa. Built in 1863 and enlarged in 1867; 22 double puddling furnaces, 13 Siemens heat-

ing furnaces, 95 cut-nail machines, one hammer, and 8 trains of rolls (18-inch muck, 21-inch muck, 23-inch muck, 23-inch nail plate, 60-inch plate, 65-inch plate, 112-inch plate, and a universal mill on which can be rolled plates 36 inches wide); product, muck bar, cut nails, and boiler, ship, bridge, and tank plate; annual capacity, 35,000 tons of muck bar, 127,000 tons of plates, and 250,000 kegs of cut nails. Fuel, coal and manufactured gas. A Roe mechanical puddling machine is connected with the works. Steel works, built in 1885-6, now contain two 10-gross-ton basic-Bessemer steel converters and one 36-inch blooming mill; first blow made July 1, 1886; steel plant idle and may be dismantled. Works originally contained 3 converters, but one was sold in 1907 to and dismantled by the Monterey Iron and Steel Company, of Monterey, Mexico. (Owned by the Pottstown Iron Company.) Total annual capacity: 45,000 gross tons of muck bar, 151,000 gross tons of iron and steel plates, and 250,000 kegs of cut nails.

READING IRON COMPANY.

Reading Iron Company; general offices, Baer Building, Reading, Pa. *Officers:* George F. Baer, Chairman of Board of Directors; F. C. Slink, President; George Schuhmann, General Manager; Frederick Butler, Treasurer; George W. Delany, Secretary. Capital stock, \$1,000,000, all common. The Reading Iron Company operates the following blast furnaces, rolling mills, etc.:

BLAST FURNACES—2.

Crumwold Furnace Department, Emaus, Pa. One stack, 66 x 16, completed and first blown in October 10, 1872; rebuilt in 1879-80 and remodeled in 1890; hoist tower and engine house destroyed by fire in 1901 and rebuilt in 1902; three 60 x 18 Gordon-Whitwell-Cowper fire-brick stoves; fuel, anthracite coal and coke; ores, New York and New Jersey magnetic and Lake Superior; product, foundry and forge pig iron; annual capacity, 45,000 tons.—*Active in 1907.*

Keystone Furnace Department, Reading, Pa. One stack, 80 x 17, built in 1898-9 and first blown in May 1, 1899; four Massicks & Crooke stoves, each 75 x 19½; fuel, anthracite coal and coke; ores, Lake Superior, local hematite, and New Jersey magnetic; product, foundry and forge pig iron; annual capacity, 100,000 tons.—*Active in 1907.*

Total annual capacity of the 2 furnaces: 145,000 gross tons.

ROLLING MILLS—5.

Danville Puddle Mill Department, Danville, Pa. Built in 1883; 8 double puddling furnaces, one 3-high 18-inch puddle train, and one rotary squeezer; product, 3, 4, 5, and 6-inch muck bars; annual capacity, 10,000 tons. Fuel, bituminous coal. (Formerly called the Danville Rolling Mill and operated by the Danville Rolling Mill Company; acquired by the Reading Iron Company on March 15, 1905.)

Montour Rolling Mills Department, Danville, Pa. Built in 1845, remodeled in 1895, and rebuilt in 1901-2; 21 double puddling furnaces, 12 heating furnaces, and 5 trains of rolls (one 12, one 16, and three 20-inch); product, muck bar, bar iron, angle iron, tie plates, iron and steel angle and plain splice bars, and grooved skelp iron; annual capacity, 28,000 tons of muck bar and 60,000 tons of finished products. Fuel, anthracite and bituminous coal.

Ninth Street Mills Department, Reading, Pa. Built in 1868 and remodeled in 1889, 1899, and 1902; 17 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 22-inch puddle with 2 squeezers, one 3-high 22-inch universal roughing with one 3-high 23-inch finishing in tandem, and one 14-inch finishing); product, muck bar and skelp, socket, and bar iron; annual capacity, 24,000 tons of muck bar and 60,000 tons of finished rolled products. Fuel, bituminous coal.

Oley Street Mills Department, Reading, Pa. Built in 1896-7 and enlarged in 1906; 33 double puddling furnaces, 2 scrap furnaces, 4 gas heating furnaces, 2 squeezers, and 3 trains of 3-high rolls (two 20-inch puddle and one 23-inch skelp); product, muck bar and skelp iron; annual capacity, 50,000 tons of muck bar and 35,000 tons of skelp. Fuel, bituminous coal.

Sheet Mill Department, Reading, Pa. Built in 1863; 12 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (one 22-inch puddle and one 22-inch plate); product, muck bar and sheared skelp and plate iron; annual capacity, 18,000 tons of muck bar and 25,000 tons of skelp and plate iron. Fuel, coal.

Total annual capacity of the 5 rolling mills: 130,000 tons of muck bar for the consumption of the company and 180,000 tons of skelp, bars, angles, plates, and other rolled iron and steel products.

TUBE DEPARTMENT.

Tube Works Department, Reading, Pa. Built in 1856; rebuilt and enlarged in 1892 and 1906; 8 pipe mills; product, wrought-iron pipe, boiler tubes, oil-well tubing and casing, trolley poles, and other tubular goods; sizes of pipe, from $\frac{1}{8}$ of an inch to 12 inches; annual capacity, 125,000 tons.

FOUNDRY AND FORGE DEPARTMENTS.

Scott Foundry Department, Reading, Pa. Built in 1854 and enlarged in 1906; product, all classes of rolling-mill and blast-furnace machinery, large iron castings, cotton compressors, sugar mills, and other general machinery; annual capacity, 10,000 tons.

Steam Forge Department, Reading, Pa. Built in 1850 and abandoned in 1901; new forge completed in 1901; one 15-ton, one 6-ton, one 5-ton, one 3-ton, and several smaller steam hammers; product, all classes of marine, engine, cotton-press, and general iron and steel forgings; annual capacity, 5,000 gross tons of light forgings and 10,000 gross tons of heavy forgings.

IRON-ORE MINES, COAL LANDS, AND OTHER PROPERTIES.

The Reading Iron Company owns the Canada, West Point, Pratt, and Ladue iron-ore tracts in Putnam county, New York, containing 2,695 acres. It also owns iron-ore rights in Albemarle, Amherst, and Nelson counties, Virginia, aggregating 3,400 acres; also the Big Pond Furnace lands in Cumberland county, Pa., containing 5,923 acres. The company also owns 7,538 acres of coal lands at Kimmelfton, Somerset county, Pa., which are in operation and are producing daily about 400 tons of bituminous coal. In addition to the above the company owns 311 acres of timber lands at New Ringgold, Schuylkill county, Pa., and 600 acres of timber and farming lands at Millerstown, Perry county, Pa.

AMERICAN IRON AND STEEL MANUFACTURING COMPANY.

American Iron and Steel Manufacturing Company; general offices, Lebanon, Pa. *Officers:* Arthur Brock, Chairman of the Board of Directors; James Lord, President; John Penn Brock, Vice President; H. M. M. Richards, Treasurer; and Daniel G. Scott, Secretary.

Sales Agencies: Postal Telegraph Building, New York; Oliver Building, Boston; Harrison Building, Philadelphia; Fourth National Bank Building, Atlanta; Rookery Building, Chicago; and Crocker Building, San Francisco.

Capital stock, \$5,550,000, of which \$3,000,000 is preferred and \$2,550,000 is common. The par value of the stock is \$50 per share, full paid. The American Iron and Steel Manufacturing Company operates the following works:

ROLLING MILLS—4.

Central Works, Lebanon, Pa. First put in operation in January, 1883; burned and rebuilt in 1886; 10 double puddling furnaces, 7 coal heating furnaces, and 5 trains of rolls (one 20-inch muck and one 8, one 10, one 12, and one 16-inch finishing); product, muck bar, merchant bar iron and steel, car forgings, bolts, nuts, washers, rivets, spikes, turnbuckles, etc.; annual capacity, 55,000 tons. Fuel, bituminous coal. Also operate a galvanizing plant.

East Works, Lebanon. Built in 1891, destroyed by fire in 1893, and rebuilt and operations resumed the same year; 12 double puddling and 5 heating furnaces and 3 trains of rolls (20-inch muck and 10 and 18-inch finishing); product, muck bar and merchant bar iron; annual capacity, 25,000 tons of refined bar iron. Fuel, coal.

West Works, Lebanon, Pa. Built in 1882-3; 11 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 20-inch muck, one tandem 12 and 8-inch finishing, one tandem 12 and 9-inch finishing, and one 12-inch finishing); product, muck bar and merchant bar iron; annual capacity, 45,000 tons of refined bar iron. Fuel, bituminous coal.

Reading Works, Reading, Pa. Rolling mill department established in 1870 and enlarged in 1880, 1886, and 1896; 6 heating furnaces and 3 trains of rolls (one tandem 18 and 10-inch train, one tandem 12 and 9-inch train, and one single 10-inch train); product, refined merchant bar and bolt iron, bolts, nuts, rivets, forgings, etc.; annual capacity, 45,000 tons. Fuel, bituminous coal.

Total annual capacity of the 4 rolling mills: 170,000 gross tons.

BOLT, NUT, AND RIVET WORKS—2.

Central Works, Lebanon, Pa. Product, bolts, nuts, washers, rivets, etc. Sizes and kinds: bolts, machine, carriage, track, plow, and elevator, (also lag screws, bolt ends, etc.,) from $\frac{1}{8}$ of an inch to $4\frac{1}{2}$ inches in diameter; nuts, hot-pressed and cold-punched, for bolts from $\frac{1}{8}$ of an inch to 4 inches in diameter; washers, all sizes of square and round.

Reading Works, Reading, Pa. Established in 1865 and enlarged in 1872, 1880, and 1886; destroyed by fire February 6, 1891, and rebuilt on a larger scale in the same year; again enlarged in 1895 and 1896; product, every variety of bolts, nuts, washers, lag screws, turnbuckles, boiler and structural rivets, railway track bolts, rods, punched plates, straps, and forgings for cars, bridges, buildings, etc. Fuel, coal and petroleum.

FORGING AND GALVANIZING WORKS AND FOUNDRIES.

Central Works, Lebanon, Pa. Product, iron and steel car forg-

ings, turnbuckles, body bolsters, arch bars, tie rods, stirrups, brake hangers, brake levers, anchor bolts, twisted straps, pole steps, eyebolts, etc.; annual capacity, 5,000 tons.

The company operates a galvanizing plant at Lebanon which is connected with its Central Works and which is equipped for galvanizing bolts, nuts, washers, turnbuckles, lag screws, rods, plates, straps, cross-arm braces, etc.; number of galvanizing pots, 3; annual capacity, 3,000 tons.

The company also operates iron and brass foundries at Lebanon, Pa. Product, gray iron machine castings and cast-iron washers and brass bearings and brass parts for machinery; annual capacity, 800 tons of gray iron castings.

Reading Works, Reading, Pa. Product, forgings for cars, bridges, etc.

RAILWAY AND DOCK SPIKE WORKS, KEG FACTORY, ETC.

Central Works, Lebanon, Pa. Product, all sizes of railway and dock spikes; annual capacity, 150,000 kegs of railway spikes of 200 pounds each and 10,000 tons of dock spikes.

The company operates a keg factory at Lebanon. Product, kegs, barrels, and boxes; annual capacity, 400,000 kegs, 8,000 barrels, and 50,000 boxes. It also owns 24 acres of undeveloped natural-gas lands on Neville Island, in Allegheny county, Pa., near Pittsburgh, which is suitable for manufacturing purposes.

TRADE MARKS.

For bolts and screws, the letter A stamped on heads; for highest grade of boiler rivets, the letter S stamped on heads; for standard grade of boiler rivets, the letter S in a ring stamped on heads.

LUKENS IRON AND STEEL COMPANY.

Lukens Iron and Steel Company; general offices, Coatesville, Pa.; branch offices, Arcade Building, Fifteenth and Market sts., Philadelphia; Whitehall Building, 17 Battery Place, New York; Board of Trade Building, 131 State street, Boston; Continental Trust Building, Baltimore; and 626-30 South Peters street, New Orleans. *Officers:* A. F. Huston, President; Charles L. Huston, Vice President; and Joseph Humpton, Secretary and Treasurer. *Selling Agents:* A. M. Castle & Co., Chicago and San Francisco; J. F. Corlett & Co., Cleveland; and Thomas Robertson & Co., Montreal. Capital stock, \$500,000, all common. The Lukens Iron and Steel Company operates the following rolling mills and steel works:

ROLLING MILLS AND STEEL WORKS—1.

Lukens Iron and Steel Works, Coatesville, Pa. Established in 1810.

The old puddle mill, which occupied the site of the first mill which rolled boiler plates in the United States, was dismantled in 1906.

The building is now used as a grinding house.

Four plate mills are connected with the works: Plate Mill No. 1 was built and put in operation in 1870; Plate Mill No. 2 was built in 1889-90 and put in operation July 2, 1890; the rolls were originally 120 inches wide but were changed to 134 inches in the fall of 1900 and to 112 inches in 1903-4 to make wide thin plates; Plate Mill No. 3 was built in 1899-1900 and put in operation in May, 1900; and Plate Mill No. 4 was built in 1901-3 and put in operation June 2, 1903.

Plate Mills Nos. 1 and 2 contain one 84-inch train, with 4 reverberatory heating furnaces, and one 112-inch train, with automatic tables, 3 gas heating furnaces, (the latter having hearths 28 feet by 7 feet,) and one 3-hole gas pit furnace; mechanical transfer cooling beds, hydraulic inspection lifts, etc.; both mills are equipped with large guillotine shears and plate-straightening machines, the latter arranged to straighten the plates after leaving the mill rolls and while red hot; product, all kinds of acid and basic open-hearth steel boiler, ship, bridge, and tank plates; annual capacity, 90,000 net tons of plates.

Plate Mill No. 3 contains one 3-high 48-inch universal mill, with 4 horizontal gas heating furnaces, electric charging and drawing crane, mechanical transfer cooling bed, electric shears, etc.; plates 80 feet long, 42 inches wide, and $\frac{1}{4}$ of an inch thick have been rolled on this mill; also shorter plates up to 48 inches wide and narrower plates over 100 feet long; steam, electric, hydraulic, and pneumatic power; product, all kinds of universal plates; annual capacity, 90,000 net tons.

Plate Mill No. 4 contains one new 3-high plate mill, with automatic tables and rolls 38 x 140 inches, fed by 3 continuous heating furnaces 9 feet wide by 50 feet long and 2 large 4-hole pit furnaces; equipped with electric cranes, straightening rolls, cooling and laying-out bed of 11,000 square feet area, on which plates are moved away from the rolls, up-edged by hydraulic lifts for examination, and delivered to the shearing department, which is equipped with three 12-foot guillotine shears and several smaller shears, circle cutters, etc.; annual capacity, 200,000 net tons of plates.

Flanging Department; a large and improved flanging department was built in 1905; it contains 3 rotary flanging machines for flanging standard flat flanged and standard dished and flanged

heads from $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inches thick, one machine to flange from 10 inches in diameter to 8 feet in diameter, one machine to flange from 3 feet in diameter to 10 feet in diameter, and one machine to flange from 5 feet in diameter to 18 feet in diameter. Also a large hydraulic universal flanging machine of 6 feet reach and 200 tons' capacity for irregular work and one large 4-column press of 400 tons' capacity. Also equipped with punches, drills, facing machine, etc., for preparing and finishing flue holes, manholes, saddle plates, manhole and handhole covers, etc.

Boiler Brace Department; this department is equipped for making all sizes of weldless hydraulic pressed boiler braces, (Huston patent.)

Repair Department and Steel Foundry; the works are thoroughly equipped with repair shops for all mechanical and electrical work; also with a steel foundry for making castings for the company's use.

Slabbing Department; one 34 x 108-inch slabbing mill built in 1901 and first put in operation December 23, 1901; product, slabs, billets, forging blanks, etc.; sizes of slabs, 50 x 18 inches, and weighing 30,000 pounds, down to 4 x 4-inch billets; annual capacity, 300,000 gross tons.

Two Open-Hearth Steel Plants: Plant No. 1 contains one 40-gross-ton acid furnace and five 40-gross-ton basic furnaces; first acid steel made early in 1892 and first basic steel in 1896. Plant No. 2 contains nine 50-gross-ton basic furnaces; first steel made April 7, 1900. Total annual capacity, 275,000 tons of basic and 25,000 tons of acid ingots. Also produce from 25 to 100 tons per month of steel castings for its own use. The plants are liberally equipped with hydraulic and electric cranes and other necessary appliances.

Fuel used in all departments of the works, manufactured gas and bituminous coal.

Total annual capacity of the rolling mills and steel works: 300,000 gross tons of open-hearth steel ingots, 300,000 gross tons of slabs and billets, and 380,000 net tons of boiler and other plates.

BLAST FURNACES, IRON-ORE MINES, COAL LANDS, ETC.

The Lukens Iron and Steel Company owns a controlling interest in the Alleghany Ore and Iron Company, which operates 3 blast furnaces and iron-ore mines at Oriskany and Vesuvius in Virginia. The Alleghany Ore and Iron Company and the Empire Steel and Iron Company also jointly control the Victoria Coal and Coke Company, which operates coal mines and coke ovens in West Virginia.—*For a description of the properties of the Alleghany Ore and Iron Company and the Victoria Coal and Coke Company see pages 194-95.*

WORTH BROTHERS COMPANY.

Worth Brothers Company; general offices, Coatesville, Pa.; branch offices and selling agencies, Arcade Building, Philadelphia; Havemeyer Building, New York; Board of Trade Building, Boston; 435-53 Holliday st., Baltimore; Citizens Building, Cleveland; Union Trust Building, Cincinnati; Monadnock Block, Chicago; Chemical Building, St. Louis; and 298 Steuart st., San Francisco. *Officers:* J. Sharpless Worth, President; W. P. Worth, Secretary and Treasurer; and L. F. Nagle, General Manager of Sales. The company operates or controls the following works:

ROLLING MILLS AND STEEL WORKS—3.

Brandywine Rolling Mills, Coatesville, Pa. Rolling Mill Department: Original mills built in 1881-2 and put in operation in February, 1882; commenced rolling steel in January, 1885; 9 heating furnaces, 10 soaking pits, 4 trains of rolls, (one 28 x 90, one 3-high 36 x 132, one 3-high 42 x 132, and one 3-high 42 x 152-inch,) and 17 electric traveling cranes, (one 50-ton, four 15-ton, and twelve 10-ton.) The trains of rolls have plate-straightening machines attached. The 42 x 152-inch plate mill was built early in 1903 and commenced rolling plates in August of that year. The works are also equipped with four 154-inch, two 132-inch, one 126-inch, one 102-inch, and one 54-inch hydraulic plate shears, as well as one 110-inch steam shear and 2 rotary shears, one of which is capable of trimming heads $1\frac{1}{2}$ inches thick by 15 feet in diameter. The works are also equipped with a complete flanging and dishing plant, capable of producing heads up to 136 inches outside diameter. This department is equipped with a large modern hydraulic press for flanging rectangular plates, irregular heads for marine and locomotive boilers, etc. Fuel, manufactured gas and bituminous coal. A machine shop, equipped with modern tools, traveling cranes, boring mills, planers, punches, etc., is connected with the rolling mills; also an electric plant for lighting the works and for operating the electric cranes, etc. The latter plant is equipped with two 75 and five 160 kilowatt generators and 2 large air compressors.

Brandywine Rolling Mills, Coatesville, Pa. Open-Hearth Steel Department: Built in 1895-6; one 35-gross-ton acid and five 35-gross-ton and ten 50-gross-ton basic furnaces, 100 gas producers, 7 electric traveling cranes, (two 80-ton ladle, four 25-ton ingot, and one 10-ton yard for handling scrap,) and 2 heavy scrap

shears for cutting up old material; first open-hearth steel made in June, 1896; annual capacity, 15,000 tons of acid and 285,000 tons of basic ingots. Fuel, manufactured gas and coal. This department includes three Wellman-Seaver-Morgan electric charging machines, one high-type and two low-type.

Product, sheared steel plates for all purposes, including locomotive fire-box, locomotive boiler, marine boiler, stationary boiler, tank, and structural work, all sizes of machine flanged and dished heads, machine flanged manholes, saddles, pressed steel man-heads, yokes, and various other pressed articles; annual capacity, 300,000 tons of finished plates.

Valley Iron Works, Coatesville, Pa. Built in 1837, rebuilt in 1888, and partly rebuilt in 1903; 3 heating furnaces and 3 trains of rolls (one 24 x 72-inch, one 30 x 96-inch, and one 30 x 110-inch); product, steel plates and sheets; annual capacity, 18,000 tons. Fuel, bituminous coal. These works will probably be repaired and remodeled or modernized in the near future. (Formerly owned by the Saxton Furnace Company; acquired by Worth Brothers Company September 20, 1906, and put in operation June 10, 1907.)

Viaduct Iron Works, Coatesville, Pa. Rolling Mill Department: Built in 1838; 14 heating furnaces, 6 trains of rolls, (2 bar and one 50, one 54, and two 62-inch plate,) one hammer, and 4 shears (two 120-inch steam guillotine, one slitting, and one rotary); straightening rolls are connected with the plate trains; product, boiler-tube skelp and iron and steel plates and sheets; annual capacity, 30,000 tons of skelp or plates and sheets. Fuel, coal. (Operated by the Coatesville Rolling Mill Company.)

Total annual capacity of the 3 rolling mills and steel works: 300,000 gross tons of open-hearth steel ingots, 30,000 gross tons of skelp or plates and sheets, and 318,000 tons of plates and sheets.

BLOOMARIES.

Viaduct Forge, Coatesville, Pennsylvania. Built in 1898 and since enlarged; 26 charcoal fires and 3 steam hammers; product, blooms used by the Viaduct Tube Works in the manufacture of charcoal boiler tubes; annual capacity, 15,000 gross tons. Fuel, charcoal. (Operated by the Coatesville Rolling Mill Company.)

WROUGHT-IRON TUBE WORKS.

Viaduct Tube Works, Coatesville, Pa. Built in 1900; one bending and 4 welding furnaces; product, lap-welded knobbled charcoal iron boiler tubes exclusively; sizes, from 1½ inches to 8 inches; annual capacity, 25,000 tons. Fuel, producer gas. (Operated by the Coatesville Rolling Mill Company.)

PENNSYLVANIA STEEL COMPANY OF NEW JERSEY.

Pennsylvania Steel Company of New Jersey; offices, Girard Building, northeast corner of Broad and Chestnut sts., Philadelphia. *Officers:* Edgar C. Felton, President; Frederick W. Wood, Vice President; Edmund N. Smith, Treasurer; and Frank Tenney, Assistant to President and Secretary.

The Pennsylvania Steel Company of New Jersey was incorporated at Trenton, N. J., on April 29, 1901, with an authorized capital stock of \$50,000,000. The capital stock is divided into 250,000 shares of common, of which 107,500 shares, of a par value of \$10,750,000, have been issued, and 250,000 shares of preferred stock, of which 165,000 shares, of a par value of \$16,500,000, have been issued. The preferred stock is non-cumulative and is to bear 7 per cent. interest.

The company owns practically all the stock of the Pennsylvania Steel Company, with works at Steelton, Harrisburg, and Lebanon, Pa., and all the stock of the Maryland Steel Company, with works at Sparrows Point, Maryland.

It also owns all the stock of the Spanish-American Iron Company, which operates extensive iron-ore mines in the Province of Santiago in the Island of Cuba.

In addition it owns the entire capital stock of the Baltimore and Sparrows Point Railroad Company, which operates 5.43 miles of track between Colgate Creek and Pennwood Park, Maryland.

It also owns the entire capital stock of the Penn-Mary Coal Company, which owns about 16,000 acres of coal lands in Indiana and Cambria counties, Pa.

It also owns a majority of the stock of the Possum Glory Coal and Coke Company, which operates coal mines in Indiana county, Pa.

THE PENNSYLVANIA STEEL COMPANY.

Practically all the stock of the Pennsylvania Steel Company is owned by the Pennsylvania Steel Company of New Jersey.

The Pennsylvania Steel Company; general offices, 312-19 Girard Building, Broad and Chestnut sts., Philadelphia; works offices, Steelton, Pa., and Lebanon, Pa. *Officers at Philadelphia:* Edgar

C. Felton, President; Frank Tenney, Assistant to President and Secretary; Edmund N. Smith, Treasurer; and H. F. Martin, General Manager of Sales. *Officers at Steelton*: J. V. W. Reyn-
ders, Vice President; H. H. Campbell, Metallurgical Engineer;
John W. Dougherty, General Superintendent; Frank D. Carney,
Assistant General Superintendent; C. W. Reinoehl, Superintend-
ent of Frog and Switch Department; and Thomas Earle, Super-
intendent of Bridge and Construction Department. *Officers at*
Lebanon: B. Dawson Coleman, Resident Director, and Quincy
Bent, Manager.

Sales Agencies: Steelton, Pa.; Girard Building, Philadelphia; Em-
pire Building, Broadway and Rector st., New York; Mason Build-
ing, 70 Kilby st., Boston; Continental Trust Building, Baltimore;
Western Union Building, Chicago; Commonwealth Trust Build-
ing, St. Louis; 1505 Chronicle Building, San Francisco; and
Sanders & Co., 110 Cannon st., London, E. C., England.

Capital stock, \$6,500,000, of which \$1,500,000 is 7 per cent. non-
cumulative preferred and \$5,000,000 is common. The Pennsyl-
vania Steel Company operates the following works:

BLAST FURNACES—7 OWNED AND 1 LEASED.

Lebanon Furnaces, Lebanon, Pa. Two stacks: No. 1, 80 x 18, built
in 1845 and rebuilt in 1868 and 1885; No. 3, 100 x 20, built in
1872-3, put in blast in August, 1873, and rebuilt in 1898; four
Massicks & Crooke, one Roberts, and three Cowper stoves; fuel,
by-product coke; ore, Cornwall; product, Bessemer and low-phos-
phorus pig iron; total annual capacity, 130,000 tons. Equipped
with one pig-iron casting machine.—*Both active in 1907.*

Lochiel Furnace, Harrisburg, Pa. One stack, 65 x 13½, built in 1872,
first put in blast in April, 1873, and remodeled in 1886; two
Whitwell stoves; fuel, anthracite coal and coke; ores, foreign and
domestic hematite and magnetite; product, Bessemer and low-
phosphorus pig iron and spiegeleisen; annual capacity, 40,000 tons
of spiegeleisen or 55,000 tons of pig iron.—*Active in 1907.*

Steelton Furnaces, Steelton, Pa. Four stacks: No. 1, 60 x 16, built
in 1872-3, put in blast in October, 1873, and remodeled in 1883;
two Whitwell stoves. No. 2, 80 x 18, built in 1874-6, put in blast
in June, 1876, and remodeled in 1877; two Whitwell and two Ken-
nedy stoves. No. 3, 85 x 18, built in 1883-4 and first put in blast
in February, 1884; three Whitwell and two Kennedy stoves. No.
4, 70 x 17, built in 1883-4 and first put in blast in April, 1884;
three Whitwell and two Kennedy stoves. Fuel, coke alone and
mixed anthracite coal and coke; ores, foreign and domestic hema-
tite and magnetite; product, Bessemer, low-phosphorus, and basic

pig iron and spiegeleisen; total annual capacity, 400,000 tons. Equipped with 2 pig-iron casting machines. Molten metal is taken from these furnaces to the Bessemer converters and open-hearth furnaces at Steelton.—*All active in 1907.*

Tidewater Furnace, (leased,) Thurlow Station, below Chester, Pa. One stack, 70 x 17, first blown in in November, 1881; rebuilt in 1892; three Foote stoves; fuel, by-product coke; ores, foreign and domestic; product, spiegeleisen and pig iron; annual capacity, 70,000 tons. (Owned by the Tidewater Steel Company; leased by the present operators in September, 1906, and first blown in by them on January 26, 1907.)—*Active in 1907.*

Total annual capacity of the 8 furnaces: 640,000 gross tons of Bessemer, basic, and low-phosphorus pig iron and spiegeleisen.

ROLLING MILLS AND STEEL WORKS.

Pennsylvania Steel Works, Steelton, Pa. Bessemer and open-hearth steel works, rail mill, merchant mill, etc.

Bessemer Steel Works; built in 1865-7; first blow made May 25, 1867; rebuilt in 1881; three 10-gross-ton converters and 5 iron and 3 spiegel cupolas; product, ingots; annual capacity, 400,000 tons. Molten metal from the Steelton Furnaces is used in the Bessemer converters. Basic-Bessemer steel was first produced in this country at these works on May 24, 1884.

Rail Mill; one 23-inch mill; built in 1867-8; changed to a 26-inch mill in 1890; 5 horizontal heating furnaces; first steel rail rolled May 15, 1868; one 3-high 34-inch blooming mill, with 6 pit heating furnaces, added to rail mill in 1875-6 and put in operation in December, 1876; product, standard sections of rails, street rails, etc.; annual capacity, 300,000 tons.

Blooming Mill No. 2; 30½-inch reversing, with 6 pit heating furnaces, built in 1885-6 and put in operation in 1886. One slabbing mill, with 26½-inch horizontal and 20½-inch vertical rolls, built in 1893; this mill has 6 pit heating furnaces and can roll slabs 48 inches wide and 32 inches thick; product, blooms and slabs for structural purposes, forging blooms, forging billets, nail slabs, and high-carbon special steel billets; annual capacity, 200,000 tons of slabs and 240,000 tons of blooms and billets.

Open-Hearth Steel Plant; two 15-gross-ton acid furnaces built in 1875; furnaces removed in 1883 and two 25-ton acid furnaces erected in 1880-4; these 2 furnaces made acid steel until 1901 when they were changed to 30-ton basic furnaces; one 5-ton acid furnace added in 1888 and dismantled in 1901, two 15-ton basic furnaces added in 1890, one 7-ton acid furnace added in 1892, six 45-ton basic furnaces added in 1893, two 40-ton acid

furnaces added in 1900, and five 75-ton basic furnaces added in 1907. First acid steel made May 6, 1875, and first basic steel (experimentally) March 1, 1889. Plant now contains 15 basic (two 15, two 30, six 45, and five 75-gross-ton) and 4 acid furnaces (one 10, one 20, and two 40-gross-ton); the 10 and 20-gross-ton acid furnaces are used for the manufacture of steel castings; product, ingots and castings; annual capacity, 485,000 tons of ingots and 18,000 tons of castings; grand total of ingots and castings, 503,000 tons. The ingots are worked into boiler, structural, and special steel. Molten metal from the Steelton Furnaces is used in the open-hearth furnaces.

Merchant Mill; built in 1883; 2 trains of rolls (one 13 and one 20-inch); billet mill, built in 1887, contains one 20-inch train; product, angles, bars, I beams, channels, splice bars, spring steel flats, rounds, light rails, tie plates and splice plates, seamless tube round billets, small billets, etc.; annual capacity, 170,000 tons. There are also machine shops and the necessary repair shops.

Crucible Steel Plant; built in 1903-5; ten 4-pot crucible steel-melting holes; 40 pots can be used at a heat; first steel made September 28, 1903; product, high-speed tool steel; annual capacity, 1,200 tons.

Connected with the works are plants for the manufacture of cross-ings, frogs, switches, signals, bridges, bolts, rivets, steel shafting, forgings, etc.; also for the erection of iron and steel buildings.

Fuel used in all departments, producer gas and anthracite and bituminous coal.

Total annual capacity of the rolling mills and steel works: 400,000 gross tons of Bessemer steel ingots, 485,000 tons of open-hearth steel ingots, 18,000 tons of open-hearth steel castings, 1,200 tons of crucible ingots, 300,000 tons of steel rails, 440,000 tons of steel billets and slabs, and 170,000 tons of other finished products.

BRIDGEBUILDING AND FROG, SWITCH, AND SIGNAL WORKS.

Bridge and Construction Department, Steelton. Product, railroad and highway bridges; also erects iron and steel buildings; annual capacity, from 75,000 tons to 100,000 tons.

Frog, Switch, and Signal Departments, Steelton. Product, frogs, switches, signals, etc., of all kinds for steam and street railways.

BOLT, RIVET, AND POLISHED STEEL SHAFTING WORKS.

Bolt and Rivet Department, Steelton. Product, bolts and rivets for the use of the company only.

Polished Steel Shafting Department, Steelton. Product, polished steel shafting; sizes, from 1 inch to $5\frac{1}{2}$ inches in diameter; annual capacity, 5,000 tons.

IRON AND STEEL FOUNDRIES AND FORGING WORKS.

Steel Foundry Department, Steelton. Built in 1900-1 and enlarged in 1903; first open-hearth steel castings made August 24, 1901, and first crucible steel castings made September 28, 1903; two acid open-hearth furnaces (one 10 and one 20-gross-ton) and ten 4-pot crucible steel-melting holes, the latter built in 1903-5; product, steel castings of all kinds from 5 pounds to 60,000 pounds in weight, including castings for mill work, general machinery, locomotive wheel centres, frames, and miscellaneous purposes; also steel rolls, pinions for rolling mills, and forging ingots; also "Manard" steel castings for frogs, switches, and crossings; also for wearing parts of mining machinery, dredges, steam shovels, stone crushers, etc.; also high-speed crucible steel; annual capacity, 18,000 tons of castings and 3,000 tons of forging ingots.

The company also operates an iron foundry at Steelton at which castings for its own consumption are made.

Forging Department, Steelton. Hammer mill contains 3 hammers (one 1, one 4, and one 12-ton); product, miscellaneous medium and heavy steel forgings; annual capacity, 5,000 tons.

IRON-ORE MINES AND RAILROADS.

The Pennsylvania Steel Company owns a majority interest in the Cornwall iron-ore banks as well as in the Cornwall and Lebanon Railroad. The railroad has 21.66 miles of main track and 4.78 miles of branch track: total length, 26.44 miles.

LIMESTONE QUARRY AND COKE OVENS.

The company owns and operates an extensive limestone quarry at Steelton, adjoining its property at that place. The limestone quarried is all consumed by the Steelton Furnaces.

It also operates 90 Semet-Solvay by-product coke ovens at Lebanon, Pa., which furnish coke for its Lebanon Furnaces. The annual capacity of these ovens is 300,000 net tons. At Steelton the company has 120 Semet-Solvay by-product coke ovens, with an annual capacity of 400,000 net tons of coke.

MARYLAND STEEL COMPANY.

All the stock of the Maryland Steel Company is owned by the Pennsylvania Steel Company of New Jersey.

Maryland Steel Company; general offices, Sparrows Point, Maryland, and Girard Building, Philadelphia. *Officers at Sparrows Point:* F. W. Wood, President; R. K. Wood, General Agent; S. S. Martin,

Superintendent ; and H. H. Campbell, Metallurgical Engineer. *Officers at Philadelphia :* E. C. Felton, Vice President ; Frank Tenney, Assistant to President and Secretary ; E. N. Smith, Treasurer ; and H. F. Martin, General Manager of Sales.

Sales Agencies : Girard Building, Philadelphia ; Empire Building, New York ; Mason Building, 70 Kilby st., Boston ; Continental Trust Building, Baltimore ; Western Union Building, Chicago ; Commonwealth Trust Building, St. Louis ; 1505 Chronicle Building, San Francisco ; and Sanders & Co., 110 Cannon st., London, E. C., England. The Maryland Steel Company operates the blast furnaces, rolling mills, steel works, etc., described below :

BLAST FURNACES—4.

Maryland Steel Company, Sparrows Point, Md. Four stacks : Furnaces A, B, C, and D, each 85 x 20 ; commenced building in August, 1887, and completed in 1889, 1890, and 1891. First blasts : A, October 23, 1889 ; B, March 11, 1890 ; C, October 3, 1891 ; and D, April 15, 1893. Each stack is equipped with four Whitwell stoves ; fuel, coke from by-product ovens at Sparrows Point ; ores, hematite from Cuba, Spain, Africa, and Lake Superior ; product, Bessemer pig iron and spiegeleisen ; total annual capacity, 500,000 tons. Furnaces are equipped with one double Heyl & Patterson pig-iron casting machine. Molten metal is conveyed from these furnaces to the Bessemer steel converters of the company.—*All active in 1907.*

Total annual capacity of the 4 furnaces : 500,000 gross tons of Bessemer pig iron and spiegeleisen.

ROLLING MILLS AND STEEL WORKS—1.

Maryland Steel Company, Sparrows Point. Built in 1889-92 ; three 18-gross-ton Bessemer steel converters, 4 iron and 3 spiegel cupolas, 10 pit heating furnaces having a capacity of 12 ingots each, one 34-inch blooming mill, and one 27-inch combined billet and rail train ; first blow made August 1, 1891, and first steel rail rolled August 3, 1891 ; molten metal direct from the blast furnaces is used in the converters ; product, billets and standard sections of rails ; annual capacity, 500,000 tons of ingots and 400,000 tons of billets and rails. Fuel, coal and petroleum. Brand, "Maryland."

Total annual capacity of the rolling mills and steel works : 500,000 tons of Bessemer steel ingots and 400,000 tons of rolled products.

SHIPBUILDING YARDS AND IRON FOUNDRY.

Maryland Steel Company, (Marine Department,) Sparrows Point. Product, all kinds of steam and sailing vessels and barges ; plant

is equipped for the construction of vessels of the largest size, both hulls and machinery, and with launching ways, machine shops, foundry, etc., sufficient to provide for, equip, and finish at one time seven large ocean freight steamers. It also builds dry docks capable of docking the largest vessels afloat.

The company also operates a foundry at Sparrows Point which produces gray iron castings for its own consumption.

COKE OVENS.

The company also operates at Sparrows Point, Maryland, 200 Otto-Hoffmann by-product coke ovens, which have an annual capacity of about 400,000 net tons of coke, all consumed by the company.

CENTRAL IRON AND STEEL COMPANY.

Central Iron and Steel Company; general offices, Harrisburg, Pa.

Officers: Edward Bailey, President; James M. Cameron, Vice President; S. B. Boude, Secretary; James B. Bailey, Treasurer and General Manager; and George R. Bentley, General Superintendent.

Sales Offices and Agents: George H. Lloyd & Co., Boston; William H. Wallace & Co., New York; Charles K. Barns & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; and W. H. H. Newman & Co., Buffalo.

Capital stock authorized, \$5,000,000, all common, of which \$2,180,000 has been issued. The Central Iron and Steel Company was formed by the consolidation in May, 1897, of the Central Iron Works, the Chesapeake Nail Works, the Paxton Rolling Mills, and the Paxton Furnaces. It owns or operates the blast furnaces, rolling mills, steel works, and other properties described below:

BLAST FURNACES—2.

Paxton Furnaces, Harrisburg, Pa. Two stacks: one, 75 x 14, built in 1855 and rebuilt in 1886; and one, 80 x 14, built in 1872 and raised to present height in 1896; six Whitwell stoves; fuel, anthracite coal and coke; ores, various kinds; product, foundry, mill, Bessemer, malleable Bessemer, and basic open-hearth pig iron; total annual capacity, 100,000 tons. Brands, "Paxton" and "Silver Spring." Molten metal from these furnaces is used in the open-hearth steel works of the company.—*Both active in 1907.* Total annual capacity of the 2 furnaces: 100,000 gross tons of foundry, mill, Bessemer, malleable Bessemer, and basic pig iron.

ROLLING MILLS AND STEEL WORKS—4.

Central Iron Works, Harrisburg, Pa. Original mill built in 1853 and dismantled in 1897. A new mill was built in 1882 and remodeled in 1896. It has 2 coal heating furnaces and one 25-inch roughing and one Lauth 3-high 25 x 72-inch finishing train of rolls with small tables for handling plates, straightening rolls, and one Morgan shear; annual capacity, 14,000 tons. Universal mill, added in 1892, has 4 heating furnaces, one soaking pit, and one train of 48-inch rolls capable of rolling plates 42 inches wide; annual capacity, 80,000 tons. New boiler plate mill, built in 1899, has 3 coal heating furnaces and one 3-high 28 x 89-inch train of rolls with tables, straightening machine, cooling beds, carriers, hydraulic shears, etc.; annual capacity, 36,000 tons. Product, boiler plate, marine and locomotive steel, ship plates, universal bridge and structural plates, tank steel, and iron plates. Fuel, coal and manufactured gas.

Paxton Rolling Mills, Harrisburg, Pa. Original mill built in 1869 and destroyed by fire in 1898; new mill built in 1892-3 and enlarged in 1899; 3 gas and 3 coal heating furnaces and one train of 3-high 34 x 126-inch rolls; product, all kinds of steel plates; annual capacity, 80,000 tons. Fuel, coal and producer gas. A flanging shop is connected with these works.

Brand, "Central." The Central Iron Works and the Paxton Rolling Mills are equipped with modern machinery for handling plates of large size and in any quantity.

Open-Hearth Steel Works, Harrisburg. Built in 1903-4; first steel made June 9, 1904; four 50-gross-ton basic furnaces; product, ingots; annual capacity, 100,000 tons. Fuel, gas coal. Molten metal is taken from the Paxton Furnaces to the open-hearth furnaces.

Chesapeake Nail Works, Harrisburg, Pa. Leased by Charles L. Bailey & Co., (incorporated.)—*For description see Rolling Mills in the Lower Susquehanna Valley, Pennsylvania, Part II.*

Total annual capacity of the operated rolling mills and steel works: 100,000 tons of open-hearth ingots and 210,000 tons of plates.

COAL LANDS AND COKE OVENS.

The Central Iron and Steel Company controls the Connellsville Basin Coke Company, which owns 2,400 acres of coal lands in Monongalia county, West Virginia. Its mines are located at Richard, on the Morgantown and Kingwood Railroad, and have an annual capacity of about 200,000 tons.

The Connellsville Basin Coke Company also operates 225 bee-hive coke ovens in Monongalia county, which have an annual capacity of about 120,000 net tons of coke.

SUSQUEHANNA IRON COMPANY.

Susquehanna Iron Company; general offices, Columbia, Pa. *Officers:* Charles Brock, President; M. N. Clepper, Secretary; and Michael Blake, Treasurer.

Capital stock, \$1,000,000. The Susquehanna Iron Company operates the following works, all of which were formerly operated by the Susquehanna Iron and Steel Company and were acquired by the Susquehanna Iron Company on August 1, 1907:

BLAST FURNACES—2.

Aurora Furnace, Wrightsville, Pa. One stack, 65 x 14½, built in 1867, rebuilt in 1874, and remodeled in 1886-7 and 1891-2; rebuilt in 1900; two Whitwell stoves; fuel, anthracite coal and coke; ores, native from York, Lancaster, and Perry counties and from Lake Superior; product, neutral forge and foundry pig iron; annual capacity, 30,000 tons. Brand, "Aurora."—*Last active in 1903.*

Vesta Furnace, Watts, Pa. One stack, 65 x 14, built in 1868, rebuilt in 1881, remodeled in 1886 and 1890, and rebuilt in 1900; two Whitwell stoves; fuel, anthracite coal and coke; ores, hematite and magnetite; product, neutral forge and foundry pig iron; annual capacity, 30,000 tons. Brand, "Vesta."—*Last active in 1903.*

Total annual capacity of the 2 furnaces: 60,000 tons of pig iron.

ROLLING MILLS—5.

Columbia Mill, Columbia, Pa. Built in 1854 and remodeled and enlarged in 1885; 12 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 10 and three 18-inch); product, skelp and tube iron; annual capacity, 20,000 tons. Fuel, bituminous coal. Brand, "Columbia."

East End Mill, Columbia, Pa. Built in 1893-4 and first put in operation in September, 1894; 3 heating furnaces, 2 double puddling furnaces, one rotary squeezer, and 2 trains of rolls (one 12 and one 18-inch); product, merchant bar iron and steel; annual capacity, 8,000 tons. Fuel, bituminous coal. Brand, "East End."

Susquehanna Mill, Columbia, Pa. Built in 1860; partly destroyed by fire in 1895; rebuilt in the same year; 13 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8 and two 16-inch); product, merchant bar iron; annual capacity, 10,000 tons. Fuel, bituminous coal. Brand, "Susquehanna."

Union Street Mill, Columbia, Pa. First put in operation July 13,

1886; 9 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 3-high 18-inch puddle, one 2-high 18-inch bar, and one 3-high 9-inch guide); product, bar iron, skelp, socket iron, oval iron, etc.; annual capacity, 15,000 tons. Fuel, bituminous coal. Brand, "Union Street."

York Mill, York, Pa. Built in 1869; 8 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (18, 22, and 26-inch,) and 2 hammers; product, plate and skelp iron; annual capacity, 10,000 tons. Fuel, bituminous coal. Brand, "York."

Total annual capacity of the 5 rolling mills: 63,000 gross tons.

WROUGHT-IRON PIPE WORKS.

Susquehanna Tube Mill, Columbia, Pa. Built in 1903 and first put in operation July 23, 1903; product, wrought-iron pipe; sizes: lap weld, from 2 to 10 inches; butt weld, from $\frac{1}{2}$ of an inch to 2 inches; annual capacity, 70,000 gross tons.

JOSEPH E. THROPP.

Joseph E. Thropp; general offices, Earlston, Pa.; telegraph and long distance telephone address, Everett. *Officers:* Joseph E. Thropp, Jr., General Manager, and George W. Hughes, Assistant Manager. *Selling Agents:* Pilling & Crane, Girard Trust Building, Philadelphia; Empire Building, New York; and Machesney Building, Pittsburgh. Mr. Thropp owns and operates the following works:

BLAST FURNACES—3.

Earlston Furnace, Earlston, Pa. One stack, 75 x 17 $\frac{1}{2}$, built in 1883-4 and first blown in December 9, 1884; three Siemens-Cowper-Cochrane stoves, each 90 x 18 $\frac{1}{2}$, and one Hartman stove, 87 x 16; fuel, West Virginia and Broad Top (Kearney) coke; ores, Lake Superior, Pennsylvania, West Virginia, and Maryland hematites; product, standard soft and strong foundry and mill pig iron; annual capacity, 80,000 tons. Brand, "Everett." (Formerly called Everett Furnace.)—*Active in 1907.*

Saxton Furnaces, Saxton, Pa. Two stacks: No. 1, 70 x 18, built in 1880-1 and blown in October 16, 1882; three stoves, each 70 x 18; No. 2, 71 x 17 $\frac{3}{4}$, built in 1886-7 and blown in November 30, 1889; three stoves, each 60 x 18; fuel, Broad Top coke; ores, hematite from Huntingdon county and Lake Superior; product, foundry, forge, and basic pig iron; total annual capacity, 160,000 tons. Brand, "Saxton." (Formerly operated by the Saxton

Furnace Company ; acquired by Mr. Thropp on September 20, 1906.)—*No. 1 idle for several years; No. 2 blown in May 1, 1907.* Total annual capacity of the 3 furnaces: 240,000 gross tons.

IRON-ORE MINES, LIMESTONE QUARRIES, COAL LANDS, ETC.

Mr. Thropp owns the Antietam iron-ore mine near Engle, W. Va., and the McCoy's Ferry iron-ore mine near North Mountain, W. Va.; also the Catoctin mine near Thurmont, Md.; the Dry Hollow mine in Huntingdon county, Pa.; and other iron-ore mines in Bedford and Huntingdon counties, Pa. The active iron-ore mines have an annual capacity of from 70,000 tons to 100,000 tons. He also owns the Hill Top and Cove Creek limestone quarries in Bedford county, Pa., and the Grafton quarry in Huntingdon county, Pa.; annual capacity, from 125,000 tons to 150,000 tons. He also owns the Kearney coal mines in Bedford county and the Melrose coal mines near Minersville, in Huntingdon county, and leases the Gordon coal mine adjoining. These mines have a total annual capacity of 250,000 tons of coking coal. He also owns 170 bee-hive coke ovens at Kearney, 36 ovens at Melrose, and 122 ovens at Saxton, Pennsylvania, which have a total annual capacity of 185,000 tons. He expects to build at Minersville, Pa., 80 ovens with an annual capacity of 40,000 net tons.

CAMBRIA STEEL COMPANY.

Cambria Steel Company, post-office drawer 1573, central post office, Philadelphia; general offices, Arcade Building, southeast corner Fifteenth and Market sts., Philadelphia. *Officers at Philadelphia:* Powell Stackhouse, President; Alexander P. Robinson, Second Vice President; Edward T. Stuart, Treasurer and Assistant Secretary; Louis K. Kruse, Assistant Treasurer; D. B. Gehly, Secretary; and Fred. Krebs, General Manager of Sales. *Officers at Johnstown:* Charles S. Price, Vice President and General Manager; H. S. Endsley, Solicitor and General Agent; and D. J. Jones, Assistant Treasurer.

Sales Offices: Arcade Building, Philadelphia; 71 Broadway, New York; Paddock Building, Boston; Ellicott Square, Buffalo; 403 Center st., Baltimore; Park Building, Pittsburgh; Citizens Building, Cleveland; Union Trust Building, Cincinnati; Century Building, Atlanta; Western Union Building, Chicago; Chemical Building, St. Louis; 140 Kansas st., San Francisco; and 1501 Pacific ave., Tacoma, Washington.

Capital stock, \$50,000,000 ; par value, \$50 per share ; issued and full paid, 900,000 shares, aggregating \$45,000,000. The Cambria Steel Company operates the following works, which were leased from the Cambria Iron Company in 1898 :

BLAST FURNACES—8.

Cambria Steel Company, Johnstown, Pa. Cambria Plant, 6 stacks, at Johnstown, and Franklin Plant, 2 stacks, at Franklin, a suburb of Johnstown.

Cambria Plant : Six stacks : Furnaces Nos. 1, 2, 3, and 4 were built in 1853 and 1854 ; No. 1, 97 x 17½, was rebuilt in 1883, 1895, 1899, and 1901 ; No. 2, 98 x 21, was rebuilt in 1883, 1891, 1896, and 1901 ; No. 3, 95½ x 20½, was rebuilt in 1886, 1894, and 1900 ; No. 4, 97 x 18, was rebuilt in 1886, 1892, and 1902 ; No. 5, 96 x 21, was built in 1873-6, blown in December 22, 1876, and rebuilt in 1890, 1896-7, and 1902 ; and No. 6, 87 x 22, was first blown in July 20, 1879, and rebuilt in 1893, 1896, 1900, and 1903 ; total annual capacity, 650,000 tons. Equipped with 24 Cowper-Kennedy stoves and 3 pig-iron casting machines.—*All active in 1907.*

Franklin Plant : Two stacks : No. 7, 85 x 22, built in 1903-6 and blown in January 17, 1906, and No. 8, 85 x 21, built in 1906-7 and blown in August 7, 1907 ; eight hot-blast stoves, each 100 x 24 ; total annual capacity, 300,000 tons. Equipped with 2 pig-iron casting machines.—*Both active in 1907.*

Fuel, Connellsville and Otto-Hoffmann coke ; ores, Lake Superior hematite and native and foreign manganiferous ; product, Bessemer and basic pig iron and spiegeleisen and ferromanganese.

Total annual capacity of the 8 furnaces: 950,000 gross tons of Bessemer and basic pig iron and spiegeleisen and ferromanganese.

ROLLING MILLS AND STEEL WORKS—3.

Cambria Steel Company, Johnstown. Three plants: Cambria Plant at Johnstown, Gautier Plant at Johnstown, and Franklin Plant at Franklin, a suburb of Johnstown.

Cambria Plant : Built as an iron rail mill in 1853 ; since greatly enlarged ; first iron rail rolled July 27, 1854, and first steel rail rolled July 12, 1871 ; now equipped with 7 Siemens ingot and 7 Siemens heating furnaces, 6 continuous furnaces, 19 reverberatory furnaces, and 11 trains of rolls, (one 2-high 48-inch blooming mill, one set ; one 2-high 40-inch blooming mill, one set ; one 3-high 30-inch billet, slab, and shape mill, four sets ; one 3-high 28-inch rail mill ; three 3-high 22-inch mills ; one 2-high 22-inch mill ; one 2-high 16-inch mill ; one 3-high 13-inch mill ; and one 3-high 9-inch mill.)

Cambria Plant : Bessemer Steel Works ; completed in 1871 ; first blow made July 10, 1871 ; rebuilt and enlarged in 1889 and 1891 and remodeled in 1900 ; four 12½-gross-ton converters ; annual capacity, 700,000 tons of ingots.

Cambria Plant : Open-Hearth Plant No. 1 ; built originally in 1878-9 ; now contains two 20-gross-ton furnaces, (one acid and one basic,) one built in 1895 and one in 1896, and two 20-gross-ton basic Wellman furnaces built in 1897 ; annual capacity, 11,000 tons of acid ingots and 34,000 tons of basic ingots.

Gautier Plant : Built in 1878 ; 4 continuous heating furnaces, (3 recuperative and one reverberatory,) 10 reverberatory furnaces, 8 trains of hot rolls, (one 3-high 8-inch, one 3-high 9-inch, one 3-high 10-inch, one 3-high 12-inch, one 3-high 14-inch, one 2-high 20-inch, one 2-high 24-inch, and one 3-high 24-inch universal,) and one train of cold rolls. The universal mill was added in 1906 and can roll universal plates from 8 to 24 inches wide. By removing the vertical rolls plates 50 inches wide can be rolled. A cold-drawing plant, with full equipment of furnaces, shears, hammers, and special machinery, is connected with the works.

Franklin Plant : Open-Hearth Plant No. 2 ; built in 1900-1 ; fifteen 50-gross-ton stationary furnaces (14 basic and one acid) ; first open-hearth steel made April 20, 1901 ; one 2-high 40-inch blooming mill, one set, and one 2-high 34-inch slabbing mill, one set, added in 1901-2 and one 134-inch plate mill added in 1902 ; annual capacity, 470,000 tons of basic and 30,000 tons of acid ingots.

Product, steel T rails from 8 pounds to 100 pounds per yard, angles and plain splice bars, standard and special track bolts and nuts ; also beams, girders, columns, roof trusses, and other fitted structural work, including finished steel work for buildings ; steel axles for passenger and freight cars, street and mine cars, tender trucks, engine trucks, etc. ; crank pins and piston rods ; machine bolts, nuts, rivets, and pipe or tank bands with rolled threads ; car and other steel forgings of carbon steel or nickel steel ; tire, toe-calk, carriage spring, and other bar steel ; finger bars, knife backs, rake teeth, spring harrow teeth, and other agricultural steel and shapes ; bar and slab plow steel, flat and finished plow shapes, etc. ; rounds, squares, hexagons, flats, shafting, and other cold-rolled steel ; steel discs with rolled bevel from 10 inches to 20 inches in diameter for harrows, drills, cultivators, etc., and steel discs with rolled bevel from 23 inches to 28½ inches in diameter for plows ; pressed steel seats for agricultural implements ; and all kinds of steel freight cars.

Fuel used in all departments, coal and producer gas.

Total annual capacity of the 3 rolling mills and steel works :

700,000 gross tons of Bessemer steel ingots, 545,000 tons of open-hearth steel ingots, 300,000 tons of steel rails, and 500,000 tons of structural shapes, universal and other plates, twisted and other bars for concrete work, plow steel, and steel for tires, springs, toe-calks, machinery, harrow discs, rake teeth, etc.

CAR AXLES AND OTHER FORGINGS.

Cambria Plant: Car Axle Department. Product, forged open-hearth steel car and locomotive axles, crank pins, piston rods, and miscellaneous forgings toughened by the Coffin process or oil tempered and annealed; annual capacity, about 30,000 gross tons.

STEEL CARBUILDING AND BOLT, NUT, AND RIVET WORKS.

Franklin Plant: Steel Carbuilding Department. Product, gondola, hopper gondola, hopper, flat, and other steel freight cars; also composite cars with steel underframes; annual capacity, 9,000 cars. All cars are built of rolled shapes. This department is equipped with a 1,000-ton hydraulic press with all the latest improvements. The product of the press is used by the company's car shops.

Franklin Plant: Bolt, Nut, and Rivet Department. Product, iron and steel bolts, nuts, and rivets; annual capacity, 9,000 tons.

COLD-ROLLED AND COLD-DRAWN SHAFTING.

Gautier Plant: Cold-Rolling and Cold-Drawing Departments. Product, cold-rolled, drawn, and turned steel shafting, piston rods, and car axles; cold-rolled and drawn screw rods, hexagons, key steel, flats, and squares; also finger bars, knife backs, angles, zees, tees, and other special shapes. Sizes: rounds, $\frac{1}{8}$ of an inch to 7 inches; squares, $\frac{1}{4}$ of an inch to 3 inches; flats, all sizes of merchant bars; and hexagons, $\frac{1}{4}$ of an inch to 2 inches. Annual capacity, 18,000 tons. Does not cold roll or cold draw iron shapes.

COAL LANDS, COKE OVENS, IRON-ORE MINES, ETC.

The Cambria Steel Company operates extensive coal mines in Cambria county; also 372 Otto-Hoffmann coke ovens at Franklin. It also owns all the stock of the Penn Iron Mining Company, operating iron-ore mines in the Menominee Range in Michigan; over 99 per cent. of the stock of the Republic Iron Company, which operates the Republic mine at Republic, Michigan; and one-half of the stock of the Mahoning Ore and Steel Company, which operates the Mahoning mine in the Mesabi Range in Minnesota. It also owns a controlling interest in the Juniata Limestone Company, Limited, which operates limestone quarries at Carlisle, Blair county, Pa., and owns and operates the Naginney limestone quarries in Mifflin county, Pa.

JONES AND LAUGHLIN STEEL COMPANY.

Jones and Laughlin Steel Company; general offices, Third ave. and Ross st., Pittsburgh. *Officers:* B. F. Jones, Jr., President; Willis L. King, Vice President and General Sales Agent; William Larimer Jones, Vice President and General Manager; James B. Laughlin, Treasurer; Wm. C. Moreland, Secretary; Thomas K. Laughlin, Assistant Treasurer; and Wendell Van Hook, Auditor.

Branch Offices: Lake and Canal sts., (also warehouse,) Chicago; White Building, Buffalo, N. Y.; 131 State st., Boston; Union Trust Building, Cincinnati; Arcade Building, Philadelphia; 220 Broadway, New York; Fourth National Bank Building, Atlanta, Georgia; and Crocker Building, San Francisco.

Sales Agents: Otis, Bonnell & Co., Cleveland; F. A. Goodrich & Co., Detroit; and the F. A. Goodrich Iron and Steel Company, St. Louis.

Capital stock, \$30,000,000, all common. The Jones and Laughlin Steel Company operates the following works:

COMPLETED BLAST FURNACES—6,

Eliza Furnaces, Pittsburgh. Five stacks, four (Nos. 1, 2, 3, and 4) 100 x 22 and one (No. 5) 85 x 21: No. 1, formerly called No. 4, built in 1888-9 and blown in in May, 1889; enlarged in 1893, partly dismantled in 1900, and enlarged and remodeled in 1901. No. 2 built in 1898-9 and blown in in September, 1899. No. 3 built in 1900 and blown in in January, 1901. No. 4 built in 1899-1900 and blown in in May, 1900. No. 5 built in 1903 and blown in April 2, 1904. Twenty Siemens-Cowper stoves; fuel, coke; ore, Lake Superior; product, Bessemer and basic pig iron; total annual capacity, 935,000 tons. Brand, "Eliza." Equipped with 3 Uehling pig-iron casting machines. Molten metal from these furnaces is used in the Bessemer converters and open-hearth furnaces of the American Iron and Steel Works. —*All active in 1907.*

Soho Furnace, Pittsburgh. One stack, 80 x 19, built in 1872 and first put in blast November 22, 1872; remodeled in 1888 and rebuilt in 1901; four improved Cowper stoves; fuel, coke; ore, Lake Superior; product, basic open-hearth and Bessemer pig iron; annual capacity, 120,000 tons. Brand, "Soho." Slag granulating pits are connected with this furnace.—*Active in 1907.*

Total annual capacity of the 6 completed furnaces: 1,055,000 gross tons of Bessemer and basic open-hearth pig iron.

BUILDING AND PROJECTED BLAST FURNACES—4.

Aliquippa Works: The company broke ground in March, 1907, for 3 coke furnaces, to be known as Nos. 1, 2, and 3, near Aliquippa, on the Pittsburgh and Lake Erie Railroad, in Beaver county, Pa., about 20 miles west of Pittsburgh, on the south side of the Ohio river. Each furnace will be 90 x 22 and will have a daily capacity of about 500 tons. Molten metal from these furnaces will be used in the open-hearth furnaces which the company is to erect near Aliquippa. An additional blast furnace is projected. When the projected furnace is completed other furnaces may be built.—*The 3 building furnaces are to be ready for operation early in 1908.*

COMPLETED ROLLING MILLS AND STEEL WORKS—2.

American Iron and Steel Works, Pittsburgh. Works in the Twenty-fourth and Twenty-fifth wards, South Side. Rolling mill built in 1852; 27 heating furnaces, 24 trains of rolls, (one 2-high 28-inch, one 2-high 38-inch, and one 3-high 40-inch blooming, one 3-high 28-inch billet, one 14-inch continuous billet, three 28-inch structural, two 22, two 16, and two 13-inch bar, and two 12, three 10, one 9, and four 8-inch guide,) and 3 hammers.

Bessemer Steel Works; built in 1886; three 10-gross-ton converters, 5 cupolas, 53 soaking pits, and one 250-ton metal mixer; first blow made August 19, 1886; annual capacity, 800,000 tons of ingots. Molten metal is taken from the Eliza Furnaces to the mixer and thence to the Bessemer converters.

Open-Hearth Steel Department; built in 1895 and enlarged in 1896 and 1902; one 25-gross-ton acid, six 40-gross-ton basic, and five 200-ton Talbot basic furnaces and one 250-ton metal mixer; first basic steel made September 28, 1895, and first acid steel made May 4, 1897; annual capacity, 15,000 tons of acid ingots and 540,000 tons of basic ingots. Molten metal is taken from the Eliza Furnaces to the mixer and thence to the open-hearth furnaces. Adding four 250-gross-ton Talbot basic open-hearth furnaces with an annual capacity of 300,000 tons, which will probably be ready for operation in January, 1908.

Product, steel bars, rails, plates, sheets, structural shapes, billets, railroad splice bars and bolts, boat and railroad spikes, machine and bridge bolts, chains, railroad coupling links and pins, forgings, steel castings, cold-rolled shafting, finger bars, spiral bars, couplings, hangers, pillow blocks, and pulleys; annual capacity, 1,200,000 tons of steel billets and blooms and 1,000,000 tons of finished material. Fuel, coal, natural gas, and producer gas. Brand, "American."

Soho Department, Second ave., near Brady st., Pittsburgh. Built

in 1859; 2 Siemens regenerative furnaces, 10 Siemens regenerative pit furnaces, and 2 trains of rolls (one 24 x 72 and one 31 x 108-inch plate); product, steel plates; annual capacity, 150,000 tons. Steel department now contains four 25-gross-ton basic open-hearth steel furnaces; first acid open-hearth steel made November 29, 1883, and first basic open-hearth steel in August, 1903; annual capacity, 70,000 tons of ingots. Fuel, coal and natural gas. Total annual capacity of the 2 completed rolling mills and steel works: 800,000 gross tons of Bessemer steel ingots, 625,000 tons of open-hearth steel ingots, 1,200,000 tons of steel billets and blooms, and 1,150,000 tons of plates, sheets, structural shapes, bars, rails, railroad splice bars, and other finished rolled material.

PROJECTED ROLLING MILLS AND STEEL WORKS.

Aliquippa Works: The company will erect near Aliquippa, Pa., 6 basic open-hearth steel furnaces, one 250-ton metal mixer, and one 2-high 40-inch blooming mill. From the blast furnaces being built near Aliquippa molten metal will be taken to the metal mixer and thence to the open-hearth steel furnaces.

SPIKE, RIVET, AND BOLT DEPARTMENTS.

Spike, Rivet, and Bolt Departments, American Iron and Steel Works, Pittsburgh. Product, structural and tank rivets, made from either Bessemer or basic open-hearth steel, with buttonhead, countersunk, cone, or steeple head, various lengths, and from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in diameter; also special low-phosphorus basic open-hearth steel boiler rivets; also all sizes of standard railroad and pit railroad spikes and all sizes of boat, barge, and dock spikes; also round and square drift bolts; annual capacity, 8,930 gross tons of rivets, spikes, bolts, etc.

STRUCTURAL MATERIAL FITTING SHOPS.

Structural Material Fitting Shops, American Iron and Steel Works, Pittsburgh. Equipped with special machines for fabricating all kinds of structural material, especially for "steel skeleton buildings;" floor framing and steel columns can be turned out rapidly; annual capacity, 30,000 tons. (These shops are being moved from the South Side, Pittsburgh, to the former site of the Keystone Rolling Mill, on the north side of the Monongahela river. Their annual capacity will be increased to about 50,000 tons.)

CHAIN FACTORY AND IRON AND STEEL FOUNDRIES.

Chain Factory, American Iron and Steel Works, Pittsburgh. Product, iron and steel proof coil, B B, B B B, and dredge chains, and close and stud-link cable, railroad brake, switch and safety, agri-

cultural, conveyor, log, and binding chains; sizes: machine-made common and crane chains from $\frac{1}{8}$ of an inch to 1 inch, hand-made B B, B B B, best hand, steel hand, and stud-linked chains from $\frac{1}{2}$ of an inch to 2 inches; annual capacity, 10,000 gross tons. Foundry Department, American Iron and Steel Works, Pittsburgh. One steel and three iron foundries, (three owned and one leased.) Product, iron and steel castings; annual capacity, 15,600 net tons of iron and 5,400 net tons of steel castings. The castings in the iron foundries are confined almost exclusively to large pulleys, sheaves, balance wheels, couplings, hangers, etc., which are finished in the machine shops. The iron foundry operated under lease is owned by the Fischer Foundry and Machine Company.

COLD-ROLLED AND COLD-DRAWN DEPARTMENT.

Cold-Rolled and Cold-Drawn Department, American Iron and Steel Works, Pittsburgh. Product, cold-rolled and cold-drawn steel rounds, squares, hexagons, pentagons, flats, angles, and zees. Sizes: rounds, $\frac{5}{8}$ of an inch to 5 inches; squares, $\frac{1}{8}$ of an inch to 4 inches; hexagons, $\frac{1}{4}$ of an inch to $1\frac{1}{8}$ inches; pentagons, $\frac{1}{8}$ of an inch to $\frac{1}{4}$ of an inch; flats, from $\frac{1}{4}$ of an inch to $2\frac{1}{2}$ inches thick and from $\frac{1}{8}$ of an inch to 3 inches wide; angles, from $1\frac{1}{8}$ inches to $3 \times 2\frac{1}{4}$ inches; and zees, from $1\frac{1}{8} \times 2\frac{1}{8} \times 1\frac{1}{8}$ to $1\frac{1}{2} \times 1 \times 2$ inches. Annual capacity, 30,000 tons of cold-rolled and 45,000 tons of cold-drawn steel products. This department does not cold roll or cold draw iron shapes of any kind.

FORGE AND MACHINE SHOPS.

Forge Department, American Iron and Steel Works, Pittsburgh. Product, forgings for large shafts, either straight, bossed, or with solid flanges; also housing screws, piston rods, connecting rods, etc., all made of steel; annual capacity, 3,000 tons.

Machine Shop Department, American Iron and Steel Works, Pittsburgh. The machine shops are equipped with tools of modern design and can produce pulleys and balance wheels up to 30 feet in diameter and handle masses weighing 50 tons. They are designed for getting out expeditiously and in large quantities power transmission machinery of all kinds, including couplings, hangers, pillow blocks, pulleys, sheaves, balance wheels, belt tighteners, guide pulleys, binder frames, and other special devices.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

The Jones and Laughlin Steel Company owns all the capital stock of the Interstate Iron Company and the Leetonia Mining Company. These companies own, through lease and in fee, a number

of mines in the Mesabi Range in the Lake Superior iron-ore region. The Jones and Laughlin Steel Company also owns all the capital stock of the Jones and Laughlin Ore Company, which operates mines in the Marquette and Gogebic Ranges. The combined annual output of all the mines is about 1,800,000 tons. In addition the Jones and Laughlin Steel Company has several long-time ore contracts in the Mesabi and Marquette Ranges. The company also owns about 1,000 acres of land near Aliquippa, Beaver county, Pa., upon which its new works are being built. The company also owns all the capital stock of the Vesta Coal Company, which owns about 20,000 acres of land in Washington county, Pa., in the fourth pool of the Monongahela river. Its mines have an annual capacity of about 2,500,000 tons of coal. The company also owns and operates 1,898 bee-hive coke ovens at Pittsburgh, with an annual capacity of 1,330,000 net tons. At its projected works near Aliquippa, Pa., the company contemplates erecting in 1907 about 900 bee-hive ovens, with an annual capacity of about 487,000 net tons of coke. It also owns a controlling interest in the Blair Limestone Company, which owns about 85 acres of limestone lands near Hollidaysburg, Pa. Its quarries have an annual capacity of about 600,000 tons. The company also owns all the capital stock of the Angeline Dock Company, which owns large docks at Ashtabula, Ohio. The company also owns all the capital stock of the Interstate Steamship Company, which owns the ore-carrying steamships B. F. Jones and James Laughlin. Each vessel has an ore-carrying capacity on each trip of 10,000 tons. The approximate ore-carrying capacity of the two vessels per season is 450,000 tons.

CRUCIBLE STEEL COMPANY OF AMERICA.

Crucible Steel Company of America; general offices, Frick Building, Pittsburgh. *Officers:* William G. Park, Chairman; Frank B. Smith, President; Reuben Miller, First Vice President; Herbert DuPuy, Second Vice President; John A. Sutton, Third Vice President; C. C. Ramsey, Fourth Vice President; Alexander Thomas, Secretary; Julius Bieler, Treasurer; George A. Turville, Comptroller; N. W. Nolen, Auditor; and G. M. Black, General Superintendent. *Branch Houses:* 381-89 Congress st., Boston; 27 Mathewson st., Providence, R. I.; 20 Hygeia st., Worcester, Mass.; 54 Taylor st., Spring-

field, Mass.; 214 State st., Hartford, Conn.; 336 York st., New Haven, Conn.; 420 Canal st., New York; 523 Arch st., Philadelphia; 306 North Gay st., Baltimore; 38 Beaver st., Albany, N. Y.; cor. Fayette and Magnolia sts., Syracuse, N. Y.; 67 Carroll st., Buffalo, N. Y.; 16-20 Lake st., Cleveland; cor. Woodbridge and Wayne sts., Detroit; 212-14 South Pennsylvania st., Indianapolis; 6 East Second st., Cincinnati; 213 West Main st., Louisville, Kentucky; cor. Newby and Foundry sts., Chattanooga, Tennessee; 16-18 South Tenth st., St. Louis; 64 South Clinton st., Chicago; 114 Clybourn st., Milwaukee, Wisconsin; Endicott Building, St. Paul, Minnesota; 1225-27 Wazee st., Denver; 748-56 Folsom st., San Francisco; 542 First ave. South, Seattle, State of Washington; 38 Dock st., St. John, N. B.; 19 St. Peter st., Montreal, Canada; 85-87 Wellington st. West, Toronto, Canada; 26 Bankside, London, S. E., England; Alsterhof, Hamburg, Germany; and 105 Boulevard de Menilmontant, Paris, France.

Capital stock, \$49,014,900, of which \$24,436,500 is 7 per cent. cumulative preferred and \$24,578,400 is common. The company operates or controls the following rolling mills, steel works, etc.:

ROLLING MILLS AND STEEL WORKS—11.

Aliquippa Steel Works, Aliquippa, Pa. Built in 1892 and first put in operation October 1, 1892; 8 heating furnaces, 2 welding furnaces, 3 trains of rolls, (two 18-inch and one 26-inch,) and 3 hammers (one 700-lb., one 1,500-lb., and one 4-ton); one 15-gross-ton basic open-hearth steel furnace with an annual capacity of 6,000 tons of ingots; 3 crucible steel-melting furnaces (one 24, one 36, and one 48-pot) with an annual capacity of 10,000 tons of ingots; product, special qualities of plate and sheet steel; annual capacity, 12,000 tons of finished products. Fuel, bituminous coal, producer gas, and natural gas. Brand, "Aliquippa."

Anderson-DuPuy Works, McKees Rocks, Pa., on the Pittsburgh and Lake Erie Railroad. Established in 1845; present works built in 1882-3; 15 heating furnaces, 2 trains of rolls, (16 and 20-inch,) and 6 hammers (60-lb. to 7-ton); two 33-pot crucible steel-melting furnaces with an annual capacity of 5,940 tons of ingots; first crucible steel made April 11, 1883; one 20-gross-ton acid open-hearth steel furnace completed in June, 1886, with an annual capacity of 10,000 tons of ingots; spring and rake-tooth department attached to works; product, plow, saw, sheet, plate, best edge-tool, agricultural, and all other grades of crucible and open-hearth steel, forgings, and coil springs of all shapes and kinds; annual capacity, single turn, 10,000 tons of rolled and 1,500 tons of forged products. Fuel, natural gas and bituminous coal. Brands, "Key-

stone" for tool steel and "Diamond" for soft-centre agricultural steel. (Formerly called the Pittsburgh Steel Works.)

- Atha Steel Works, Harrison, N. J. Built in 1888-9 and first put in operation in April, 1889; one 30 and two 48-pot crucible steel-melting furnaces with an annual capacity of 10,000 tons of ingots; one 20-gross-ton acid open-hearth steel furnace with an annual capacity of 12,000 tons of ingots added in 1907 and first steel made July 11, 1907; 24 heating furnaces, 6 trains of rolls, (one 8, two 9, one 10, one 12, and one 16-inch,) and 23 steam hammers; product, tool, die, spring, and cutlery steel, all grades of merchant bar, wire rods in coils, and forgings; annual capacity of rolled products, 25,000 tons; of forged products, 6,000 tons. Fuel, coal.
- Black Diamond Steel Works, (formerly operated by the Park Steel Company,) Pittsburgh. Built in 1862; 32 single and 21 double puddling furnaces, 80 heating furnaces, 4 scaling furnaces, 7 annealing furnaces, and one refining furnace; two 24, one 30, two 42, and seven 48-pot crucible steel-melting furnaces with an annual capacity of 34,500 tons of ingots; first crucible steel made October 1, 1862; eight 50-gross-ton converting or cementing furnaces with an annual capacity of 3,500 tons; 5 acid open-hearth steel furnaces (two 18, two 30, and one 50-gross-ton) with an annual capacity of 70,000 tons of ingots, and 4 basic open-hearth furnaces (one 50 and three 30-gross-ton) with an annual capacity of 51,000 tons of ingots; first acid open-hearth steel made in April, 1880, and first basic open-hearth steel on May 6, 1894; 22 trains of rolls, (one 18-inch muck, one 9-inch, three 10-inch, one 12-inch, two 14-inch, one 16-inch, two 18-inch, one 21-inch, one 30-inch blooming, four 20-inch sheet, one 20-inch cogging and plow slab, one 26-inch saw plate, one 32-inch boiler plate, one 24-inch hot-rolling copper, and one 16-inch cold-rolling copper,) 2 sets of pointing rolls, and 32 hammers (two 5-ton finishing, one 55-cwt. finishing, one 20-cwt. finishing, seven 15-cwt. welding, two 15-cwt. finishing, six 1,250-lb. finishing, seven 700-lb. finishing, three spring-pointing, two blister-breaking, and one blacksmith); product, hammered and rolled crucible and open-hearth steel of every description; annual capacity, 128,000 tons of finished rolled and 7,600 tons of forged products. Fuel, coal and natural gas. Also operate a boiler-head flanging shop and a crucible factory; also the Lake Superior Copper Mills, which are equipped with hot-rolling and cold-rolling mills.
- Canton Steel Works, Canton, Ohio. Built in 1872; 12 heating furnaces, 3 welding furnaces, 5 hammers, 3 trains of rolls, (one 10, one 12, and one 20-inch,) and one 15 and two 10-gross-ton acid open-hearth steel furnaces; first open-hearth steel made August 17, 1875; product, tool steel, cast steel, and spring steel; an-

nual capacity, 20,000 gross tons of ingots and 18,000 tons of rolled products. Fuel, bituminous coal. Brand, "Canton." (Formerly operated by the Canton Steel Company; acquired by the Crucible Steel Company of America on September 12, 1905.)

Crescent Steel Works, Forty-ninth to Fifty-first sts., Pittsburgh.

Built in 1865; 22 puddling furnaces, 41 heating furnaces, 9 annealing furnaces, 14 trains of rolls, (one 8, two 9, one 12, two 14, two 16, and one 18-inch hot and one 6 and four 10-inch cold,) 22 hammers, 6 electric cranes, one air compressor, one 60-ton converting furnace, one 60-pot and three 36-pot crucible steel-melting furnaces with an annual capacity of 12,000 tons of ingots, and two 15-gross-ton special open-hearth steel furnaces with an annual capacity of 15,000 tons of ingots; first crucible steel made in 1865 and first open-hearth steel in 1890; product, hammered and rolled bar steel and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 27,000 tons of rolled and hammered products. Also operate a drill-rod shop and a wire factory. Fuel, coal, coke, and natural and producer gas. Brand, "Crescent."

Howe, Brown & Co. Works, Penn ave. and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 16 hammers with 22 furnaces, 6 smith-shop fires,

one smith-shop steam hammer, one double and 4 single annealing furnaces, six 24-pot and two 30-pot crucible steel-melting furnaces with an annual capacity of 10,000 tons of ingots, 11 trains of rolls, (one 9, one 10, one 12, three 16, three 18, one 22, and one 28-inch,) one rake-tooth factory with 12 bending machines and 12 heating furnaces, and one machine shop with 7 lathes, planers, etc.; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 11,000 tons. Open-hearth steel department originally built in 1879; first acid steel made in that year; now equipped with one 15-gross-ton basic furnace with an annual capacity of 7,500 tons of ingots; first basic steel made in 1901; product, spring, plow, and machinery steel, plates for boilers, hulls of vessels, etc.; annual capacity, 7,200 tons of plates, 3,600 tons of machinery steel, 1,800 tons of plow steel, and 1,800 tons of spring steel. Fuel, coal, natural gas, and producer gas. Brand, "Howe."

La Belle Works, Ridge ave. and Rebecca st., Allegheny, Pa. Built in 1863; 36 forge and heating furnaces, 7 Swindell gas producers, three 42-pot crucible steel-melting furnaces, 11 hammers, 6 trains of rolls, (one 9, one 10, one 14, one 16, one 20, and one 24-inch,) and two 15-gross-ton acid open-hearth steel furnaces, one built in 1886 and one built in 1887; first crucible steel made about 1865 and first open-hearth steel made September 21, 1886; product, high-grade merchant steel of every description, tool and machinery

steel, solid crucible and open-hearth and soft-centre plow and agricultural implement steel, finished harrow discs, flat, round, square, and double beveled table cutlery steel, magnet, lawn mower, auger bit, skate, deep drawing, and cupping steel, and forgings and die blocks; annual capacity, 21,000 tons of open-hearth steel ingots, 10,000 tons of crucible steel ingots, and 25,000 tons of finished products. Fuel, coal, natural gas, and manufactured gas. Brand, "La Belle." (Formerly called the La Belle Steel Works.)

Sanderson Brothers Steel Works, Syracuse, N. Y. Established in 1876; 14 heating furnaces, 9 annealing furnaces, 10 hammers, 4 trains of rolls, (one 16-inch sheet and one 9, one 10, and one 12-inch finishing,) and six 24 and four 12-pot Siemens crucible steel-melting furnaces with an annual capacity of 15,000 tons of ingots; product, hammered and rolled crucible steel of every description, shear steel, and sheet steel; specialty, the finest quality of tool steel; annual capacity, 10,500 tons. Also operate a cold-drawing department. Fuel, coal. Brand, "Sanderson Bros. & Co."

Singer, Nimick & Co. Works, in the Thirty-fourth ward, Pittsburgh. Built in 1848; 14 steam hammers, one train of muck rolls, 3 trains of bar rolls, 4 trains of sheet and plate rolls, (one 18, one 20, one 22, and one 28-inch,) one cold-rolling mill, one band mill, and one cold-drawing mill; four 24, one 36, and one 48-pot crucible steel-melting furnaces with an annual capacity of 16,200 tons of ingots; also an axle factory and a harrow disc and rolling colter factory; product, tool, saw, sheet, plate, and agricultural steel; also carriage axles and cold-rolled steel; total annual capacity of rolled and forged products, 23,000 tons. Fuel, natural gas, manufactured gas, and coal. (One 10-gross-ton acid open-hearth steel furnace dismantled.)

Spaulding-Jennings Works, Jersey City, N. J. Built in 1880 and enlarged in 1900; nine 4-pot crucible steel-melting holes and 4 hot mills, (one 18-inch mill with one stand of 3-high and 3 stands of 2-high rolls and 16 heating furnaces, one 12-inch mill with 5 stands of 3-high rolls and 16 heating furnaces, one 10-inch mill with 3 stands of 3-high rolls and 8 heating furnaces, and one 9-inch mill with 4 stands of 3-high rolls and 8 heating furnaces.) A cold-rolling department connected with the works contains 2 cold mills, (one 4-stand and one speed mill with 2 stands,) one Mossberg machine, 9 pickling tubs, and 3 annealing furnaces. Two wire-drawing mills and a pickling and cleaning department connected with the works contain 9 annealing furnaces, a large number of drawing blocks, drawing, straightening, and polishing benches, etc. A plant for the manufacture of tempered and untempered flat wire, equipped with rolling, flattening, and polishing machines and oil tem-

pering and metallic hardening furnaces, is also connected with the works. Works also equipped with 3 hammers and 13 heating furnaces for welding and cogging purposes. Product, crucible cast steel, bright drawn steel, flat cold-rolled steel, drawn wire, and flat untempered and tempered wire; also rerolled nickel-steel and Bessemer and open-hearth steel billets; annual capacity, single turn, 3,000 tons of crucible steel ingots, 10,900 tons of hot-rolled products, 1,000 tons of cold-rolled products, 5,600 tons of wire, 2,200 tons of flat untempered wire, and 800 tons of flat tempered wire. Fuel, coal. (Formerly called the West Bergen Steel Works.)

Total annual capacity of the 11 works: 212,500 gross tons of open-hearth steel ingots, 133,140 tons of crucible and cemented steel ingots, 371,500 tons of finished rolled, hammered, and forged products, and about 2,000 tons of finished copper products.

IRON AND STEEL FORGING PLANTS.

Anderson-DuPuy Works, McKees Rocks: Product, general forgings; annual capacity, 3,000 tons. Atha Steel Works, Harrison, N. J.; product, general forgings; annual capacity, 6,000 tons. Black Diamond Steel Works, (formerly operated by the Park Steel Company,) Pittsburgh; product, hammered crucible and open-hearth steel of every description; annual capacity, 7,600 tons. Crescent Steel Works, Forty-ninth to Fifty-first sts., Pittsburgh; product, general forgings. Howe, Brown & Co. Works, Penn ave. and Seventeenth st., Pittsburgh; product, special forgings. La Belle Steel Works, Ridge ave. and Rebecca st., Allegheny, Pa.; product, general forgings. Sanderson Brothers Steel Works, Syracuse, N. Y.; product, general iron and steel forgings. Singer, Nimick & Co. Works, in the Thirty-fourth ward, Pittsburgh; product, forged vehicle axles. Total number of forging plants: 8.

WIRE RODS, DRILL RODS, WIRE, COPPER AND COLD-DRAWN AND COLD-ROLLED PRODUCTS, ETC.

Atha Steel Works, Harrison, N. J. Product, wire rods in coils from No. 5 gauge to $\frac{3}{8}$ of an inch rod, to be cold drawn to smaller sizes; annual capacity, single turn, 6,000 tons.

Black Diamond Steel Works, Pittsburgh. Connected with these works is a boiler-head flanging shop and a factory for the manufacture of crucibles. Also a plant, operated by the Lake Superior Copper Mills, which is equipped for the manufacture of hot-rolled and cold-rolled copper products; annual capacity, 2,000 gross tons.

Crescent Steel Works, Pittsburgh. Drill Rod Shop and Wire Fac-

tory. Drill Rod Shop: Product, polished drill rods, scoured drill rods, lime-finished rods, and rods in coils; annual capacity, 500,000 pounds. Wire Factory: 10 wire-drawing blocks; sizes, from .013 rods to 1.500 rods for punches, reamers, taps, drills, dental tools, needle wire, etc.; annual capacity, 500,000 pounds.

Sanderson Brothers Steel Works, Syracuse, N. Y. Product, cold-drawn needle wire, drill rods, and shapes; sizes, from No. 35 gauge to 2 inches in diameter, in tool steel quality.

Singer, Nimick & Co. Works, Pittsburgh, Pa. Product, cold-drawn shafting, special shapes for automobile and bicycle work, axle steel, tool steel dies, and special shapes; annual capacity, 3,000 tons.

Spaulding-Jennings Works, Jersey City, New Jersey. Product, drawn and flat untempered and tempered wire; annual capacity, single turn, 5,600 gross tons of drawn wire, 2,200 tons of flat untempered wire, and 800 tons of flat tempered wire.

PRESSED STEEL CAR COMPANY.

Pressed Steel Car Company; general offices, Farmers Bank Building, Pittsburgh. *Home Offices:* 243 Washington st., Jersey City, N. J., Blair & Co. Building, 24 Broad st., New York; and Old Colony Building, Chicago. *Foreign Offices:* 20 Broad st. House, London, E. C., England; 68½ Pitt st., Sydney, New South Wales, Australia; and Prolongacion del 5 De Mayo No. 9, City of Mexico, D. F., Mexico. *Officers at New York:* F. N. Hoffstot, President; O. C. Gayley, Second Vice President; A. H. Larkin, Secretary; and J. H. Regan, Assistant Secretary. *Officers at Pittsburgh:* J. W. Friend, Vice President; P. G. Jenks, Treasurer; S. E. Moore, Auditor; and J. B. Rider, Assistant to Vice President. *Officers at McKees Rocks:* J. V. Maher, Assistant to Vice President; C. A. Lindstrom, Chief Engineer; F. Ditchfield, General Superintendent; P. M. Kling, Manager Passenger Car Department; J. W. Scull, Purchasing Agent; and H. E. Graham, General Freight Agent.

Sales Department: O. C. Gayley, Second Vice President, New York; J. C. E. Postlethwaite, Sales Manager for Central District, Pittsburgh; J. H. Mitchell, Sales Manager for Western District, Chicago; and L. O. Cameron, Sales Manager for Southern District, Atlanta, Ga.

Capital stock, \$25,000,000, of which \$12,500,000 is 7 per cent. non-cumulative preferred and \$12,500,000 is common. The par value of each share is \$100. The Pressed Steel Car Company operates the following plants in Pennsylvania:

CARBUILDING AND OTHER PLANTS—2.

Allegheny Freight Car Plant, Allegheny, Allegheny county, Pa.
McKees Rocks Freight and Passenger Car Plants, McKees Rocks.

GENERAL DESCRIPTION.

Product: Pressed and structural steel and composite cars for all classes of railway traffic, tank cars, street cars, mining cars, trucks, truck frames, bolsters, centre plates, brake beams, stake pockets, stakes, miscellaneous appliances and specialties for railway cars, and miscellaneous pressed steel specialties.

The Pressed Steel Car Company is also authorized to deal in all kinds of iron and steel products or the products of other metals and wood.

Total annual capacity of the 2 plants at Allegheny and McKees Rocks: 45,000 steel underframe wooden superstructure and all-steel freight cars, 300 steel passenger, baggage, postal, express, or street cars, 120,000 truck frames, and 250,000 bolsters.

PITTSBURGH STEEL COMPANY.

Pittsburgh Steel Company; general offices, Frick Building, Pittsburgh; New York offices, 29 Broadway. *Officers at Pittsburgh:* Wallace H. Rowe, President; John Bindley, Vice President; Charles E. Beeson, Secretary; William C. Reitz, Treasurer; and F. H. Forman, General Sales Agent.

Capital stock, \$6,000,000. The Pittsburgh Steel Company operates or is building the following rolling mills, steel works, etc.:

ROLLING MILLS AND STEEL WORKS—2.

Glassport Works, Glassport, Allegheny county, Pa. Built in 1899-1900 and first put in operation in March, 1900; one continuous and 2 regenerative gas heating furnaces, 3 trains of rolls, (one 8, one 10, and one 20-inch,) and one hammer; product, steel billets, hoops, bands, and cotton-ties; annual capacity, 30,000 tons of billets and 30,000 tons of hoops, bands, and cotton-ties. Fuel, manufactured gas and bituminous coal.

Monessen Works, Monessen, Westmoreland county, Pa. Built in 1901-2 and first put in operation in December, 1902; one semi-continuous Garrett rod mill, equipped with 3 continuous heating furnaces and containing one 16, one 14, and three 12-inch trains of rolls; product, wire rods; 4-inch billets rolled direct into No. 5 wire rods; annual capacity, 150,000 tons of wire rods.

Fuel, coal, coke, and natural and manufactured gas. Basic open-hearth steel furnaces and a blooming mill are being added.

WIRE-DRAWING AND WIRE-NAIL DEPARTMENTS.

Monessen Works, Monessen, Pa. Wire-drawing department: number of wire-drawing blocks, 200; product, all kinds of high-grade plain, annealed, galvanized, and special wire made from Bessemer and open-hearth steel; annual capacity, 125,000 net tons. Wire-nail department: number of wire-nail machines, 200; product, all sizes of wire nails; annual capacity, 1,500,000 kegs.

GALVANIZING, BARB-WIRE, AND FIELD-FENCE DEPARTMENTS.

Monessen Works, Monessen, Pa. Galvanizing department: annual capacity, 60,000 net tons. Barb-wire department: product, painted and galvanized barb wire; annual capacity, 30,000 net tons. Field-fence department: product, all kinds of field fencing; annual capacity, 25,000 net tons. Specialty, "Pittsburgh Perfect" fencing.

Total annual capacity of the works: 30,000 gross tons of steel billets, 30,000 gross tons of hoops, bands, and cotton-ties, 150,000 gross tons of wire rods, 125,000 net tons of wire, 60,000 net tons of galvanized products, 30,000 net tons of barbed wire, 25,000 net tons of field fencing, and 1,500,000 kegs of wire nails.

A. M. BYERS COMPANY.

A. M. Byers Company; general offices, 235 Water st., Pittsburgh. *Officers:* Dallas C. Byers, President; E. M. Byers, Vice President; H. M. Richardson, Secretary and Treasurer; and Charles Gross, General Manager. *Sales Agencies:* John Maneely, 309 Arch st., Philadelphia; E. F. Keating Company, 452 Water st., New York; G. Frank Uhler, 32 Oliver st., Boston; and Bourne Fuller Company, Hickox Building, Cleveland.

Capital stock, \$1,500,000, of which \$500,000 is preferred and \$1,000,000 is common. The A. M. Byers Company operates the following blast furnaces, rolling mills, and pipe and tube plants:

BLAST FURNACES—1.

Mattie Furnace, Girard Iron Company, operators, Girard, Ohio. One stack, 85 x 18½, built in 1866, remodeled in 1879, stack raised in 1884, and rebuilt in 1892, 1896, and 1901; three Foote stoves, each 70 x 20, and one Massicks & Crooke stove, 90 x 20; fuel, Con-

nellsville coke; ore, Lake Superior; product, Bessemer, malleable Bessemer, foundry, and forge pig iron; annual capacity, 100,000 tons. Brand, "Girard." Dallas C. Byers, President, and E. M. Byers, Vice President and Treasurer, Pittsburgh; and S. K. Hine, Manager, Girard. Selling agents, A. M. Byers Company, Pittsburgh. (Owned by the A. M. Byers Company.)—*Active in 1907.* Annual capacity: 100,000 tons of Bessemer and other pig iron.

ROLLING MILLS—2.

A. M. Byers Company Works, (owned,) Sixth st., South Side, Pittsburgh. Built in 1862-3; 25 single puddling furnaces, 5 heating furnaces, one scrap furnace, and 3 trains of rolls (one 21-inch muck, one 21-inch plate, and one 17-inch skelp); product, muck bar and skelp iron, all consumed by the company in the manufacture of pipe; annual capacity, 20,000 tons of muck bar and 16,000 tons of skelp iron. Also make lap-welded and butt-welded wrought-iron pipe, galvanized products, etc. Fuel, natural gas in finishing mills and coal in puddling furnaces.

Clearfield Mill, (leased,) Clearfield, Pa. Works at Hyde, Clearfield county. Built in 1903 and first put in operation June 22, 1903; 4 double and 12 single puddling furnaces, one continuous and 2 reverberatory heating furnaces, and 3 trains of rolls (one 3-high 22-inch puddle, one 3-high 14-inch roughing, and one 9-inch finishing); product, muck bar and skelp; annual capacity, 15,000 tons of muck bar and 18,000 tons of skelp iron, all consumed by the company in the manufacture of wrought-iron pipe. Fuel, bituminous coal. (Owned by the Clearfield Steel and Iron Company; leased by the A. M. Byers Company in December, 1903. The works are also equipped with one 18-inch rail mill, which is not leased by the A. M. Byers Company.)—*See Part II, Clearfield Steel and Iron Company, Western Pennsylvania District.*

Total annual capacity of the 2 rolling mills: 35,000 gross tons of muck bar and 34,000 tons of skelp iron, all consumed by the company in the manufacture of lap-welded and butt-welded wrought-iron gas, steam, and water pipe, oil-well tubing, casing, etc.

PIPE AND TUBE WORKS AND GALVANIZING PLANT.

Pipe and Tube Department, Sixth st., South Side, Pittsburgh. Product, full weight wrought-iron gas, steam, and water pipe; also oil-well tubing, casing, etc.; sizes: butt-welded pipe, $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inches inclusive; lap-welded pipe, $1\frac{1}{2}$ to 8 inches; annual capacity, 55,000 tons of pipe.

Galvanizing Department, Sixth st., South Side, Pittsburgh. Number of galvanizing pots, 1; product, galvanized wrought-iron pipe.

CARTER IRON COMPANY.

Carter Iron Company; general offices, Park Building, Pittsburgh.
Officers: Robert A. Carter, President, and G. T. Lewis, Secretary and Treasurer.

Selling Agents: Christopher Murphy & Co., First National Bank Building, Chicago; N. S. Faucett, Colorado Building, Washington, D. C.; and H. C. McNair, Endicott Building, St. Paul.

The Carter Iron Company owns or controls the following works:

BLAST FURNACES—1.

Ivanhoe Furnace, Ivanhoe Furnace Company, owners and operators, Ivanhoe, Va. One stack, 70 x 13½, built in 1881-2 to use charcoal and first put in blast in March, 1882; rebuilt to use coke in 1887-8 and blown in January 2, 1889; stack raised in 1893; one 2-pass Foote stove, 65 x 16, and two Whitwell stoves; fuel, Pocahontas coke; ores, local and Lake Superior; product, Bessemer, basic, and foundry pig iron; annual capacity, 25,000 tons. Brand, "Ivanhoe." A small foundry is connected with the furnace. Robert A. Carter, President, and G. T. Lewis, Secretary and Treasurer, Pittsburgh; Howard H. Carter, Vice President and Superintendent, Ivanhoe. (Formerly operated by the New River Mineral Company; controlled by the Carter Iron Company.)—*Active in 1907.*

Annual capacity: 25,000 tons of foundry and other grades of pig iron.

ROLLING MILLS—2.

Hays Station Works, Monongahela Iron and Steel Company, owners and operators, Hays Station, Allegheny county, on the Pittsburgh and Lake Erie Railroad and Pennsylvania Railroad. Built and put in operation in 1891; 16 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 20-inch muck and one 10 and one 18-inch finishing); product, fine grades of muck bar; staybolt iron, and merchant sizes of bar iron; annual capacity, 15,000 tons. Fuel, natural gas. Brands, "Carter," "Monon," and "Ivanhoe." Also make chains. Robert A. Carter, President and Manager; G. T. Lewis, Secretary and Treasurer. (Controlled by the Carter Iron Company.)

Paden City Works, Paden City, Wetzel county, West Va. Built in 1903-5 and first put in operation in 1906; now equipped with 14 double puddling furnaces, (10 double puddling furnaces are being added,) 3 sheet furnaces, 3 pair furnaces, 2 annealing fur-

naces, one 20-inch muck mill, and 5 stands of rolls (one 26 x 44-inch roughing and one 26 x 44-inch and two 26 x 38-inch sheet, all hot, and one 22 x 44-inch cold); product, chemical sheet iron, fine roofing iron, etc.; annual capacity, including building puddling furnaces, 20,000 tons of muck bar and about 6,000 tons of sheets. Fuel, natural gas. (Two partly-erected Siemens open-hearth steel furnaces dismantled, (one 20-gross-ton acid and one 25-gross-ton basic.) Partly built by the Ohio Valley Steel and Foundry Company; completed by the Watson Iron and Steel Company; controlled and operated by the Carter Iron Company.) Total annual capacity of the 2 rolling mills and steel works: 40,000 tons of muck bar, 15,000 tons of bar iron, and 6,000 tons of sheets.

CHAIN WORKS.

Hays Station Works, Monongahela Iron and Steel Company, Hays Station, Pa. Product, all sizes of "Carter" ball-bearing and other high-grade iron chains made from "Carter" bar iron.

IRON-ORE LANDS.

The Carter Iron Company owns the capital stock of the Ivanhoe Furnace Company, which owns iron-ore lands at Ivanhoe and at Abingdon, Va.

FIRTH-STERLING STEEL COMPANY.

Firth-Sterling Steel Company; general offices, McKeesport, Pa.; branch offices, Giesboro Manor, District of Columbia, (post-office address, box 812, Washington, D. C.) *Officers:* Lewis J. Firth, President, Sheffield, England; Austin A. Wheelock, Vice President, 23 Cliff st., New York; James E. Porter, Secretary, and Eben B. Clarke, Treasurer and General Manager, McKeesport, Pa. *Selling Agencies:* 35 Oliver st., Boston; 23 Cliff st., New York; 15 North Seventh st., Philadelphia; First and Ross sts., Pittsburgh; 164 West Lake st., Chicago; and Fremont and Howard sts., San Francisco.

Capital stock authorized, \$1,500,000, all common. The Firth-Sterling Steel Company operates the following works:

ROLLING MILLS AND STEEL WORKS—2.

Demmler Works, Demmler, Allegheny county, Pa. Established in 1875 and first crucible steel made in that year; 4 crucible steel-melting furnaces, (one 12, two 30, and one 36-pot,) 18 heating furnaces, 11 hammers, (from 400 lbs. to 6 tons,) and 4 trains of

rolls (one 8, one 10, one 12, and one 16-inch); product, fine crucible tool steel; annual capacity, 10,000 tons. Fuel, bituminous coal and natural gas. Brand, "Firth-Sterling."

Ordnance Works, Giesboro Manor, District of Columbia. Construction commenced in January, 1906; completed and put in operation in January, 1907; 2 open-hearth steel furnaces, (one 20-gross-ton Swindell stationary acid and one 5-gross-ton Wellman tilting basic,) 9 heating furnaces, and 6 hammers; first basic open-hearth steel made in February, 1907, and first acid open-hearth steel in May, 1907; product, castings, forgings, etc.; annual capacity, 18,500 tons of acid and 5,700 tons of basic castings. Fuel, producer gas and oil.

Total annual capacity of the 2 rolling mills and steel works: 18,500 gross tons of acid and 5,700 gross tons of basic open-hearth steel castings and 10,000 gross tons of fine crucible tool steel.

THE SHENANGO FURNACE COMPANY.

The Shenango Furnace Company; general offices, Frick Building, Pittsburgh; branch offices, Sharpsville, Pa.; Hibbing, Minnesota; Wilpen, Pa.; and Duluth, Minnesota. *Officers:* W. P. Snyder, President; C. D. Dyer, Vice President; Henry Irwin, Jr., Secretary and Treasurer; and W. A. Barrows, Jr., General Manager. *Selling Agents:* W. P. Snyder & Co., Pittsburgh.

Capital stock, \$5,000,000, all common. The Shenango Furnace Company operates or controls the following works:

BLAST FURNACES—4 COMPLETED AND 1 BUILDING.

Shenango Furnaces, Sharpsville, Pa. Four completed stacks and one stack building.

Completed stacks: No. 1, 60 x 15, built in 1870, blown in in March, 1871, and rebuilt and enlarged in 1879; No. 2, 60 x 15½, built in 1872, blown in in February, 1873, and enlarged in 1881; No. 3, (formerly called Spearman Furnace,) 76 x 18½, built in 1895 and blown in September 1, 1895; and No. 4, (formerly called Mabel Furnace and operated by Perkins & Co., Limited,) 75 x 15½, built in 1872 and rebuilt in 1883, 1889, and 1906. No. 4 was acquired by the Shenango Furnace Company on May 3, 1905. Nos. 1 and 2 have two Pierce and three Pollock iron pipe stoves and Nos. 3 and 4 have each four Massicks & Crooke stoves.

Fuel, Connellsville coke; ore, Lake Superior; product, standard Bessemer, basic, and malleable pig iron; total annual capacity, 350,-

000 tons, cast in sand or chills. Brand, "Shenango." Equipped with one Aultman pig-iron casting machine. Adding one Uehling pig-iron casting machine.—*All completed furnaces active in 1907.*
Building stack: Ground for the foundations for one stack, to be known as New No. 2, was broken on August 17, 1906; it will be 77 x 20 and will be equipped with four Massicks & Crooke hot-blast stoves, each 85 x 21; coke will be used for fuel; product, Bessemer and basic pig iron; estimated annual capacity, 130,000 tons.—*To be ready for blast in October or November, 1907.*
Total annual capacity of the 4 completed furnaces, 350,000 tons; of the building furnace, 130,000 tons: grand total, 480,000 tons.

IRON-ORE LANDS, COAL MINES, AND COKE OVENS.

The Shenango Furnace Company owns the Shenango, Webb, White-side, and two unopened iron-ore mines in the Mesabi Range. It also owns a one-half interest in the Antoine Ore Company, which operates the Clifford, Cornell, Vulcan, Traders, and Keel Ridge mines in the Menominee Range. Its iron-ore lands aggregate 400 acres in the Mesabi and 461 acres in the Menominee Ranges.
The company also owns 1,500 acres and controls the output of 2,500 additional acres of coking coal lands in Fayette and Westmoreland counties, Pa., on which coal for its coke ovens is mined.
It also owns 400 bee-hive coke ovens at Wilpen, Westmoreland county, Pennsylvania, and controls the output of 2,100 bee-hive coke ovens in the Connellsville region. These ovens have a total annual capacity of about 270,000 net tons of coke.

ORE-CARRYING STEAMSHIPS.

The Shenango Furnace Company also controls the capital stock of the Shenango Steamship Company, of Cleveland, which owns the steamships William P. Snyder and Wilpen and operates 7 other smaller steamships. The 9 vessels have an annual ore-carrying capacity of about 1,000,000 tons. The officers of the steamship company are W. P. Snyder, President; H. H. Brown, Vice President; C. D. Dyer, Secretary; and Henry Irwin, Jr., Treasurer.

UNITED IRON AND STEEL COMPANY.

United Iron and Steel Company; general offices, Peoples Savings Bank Building, Pittsburgh. *Officers:* Edwin N. Ohl, President; William H. Schoen, Vice President; Alexis W. Thompson, Treasurer; and E. M. Peters, Secretary and Assistant Treasurer.

Capital stock, \$2,000,000, all common. The United Iron and Steel Company was organized and incorporated on November 27, 1906. On February 8, 1907, it absorbed the plants and properties formerly owned or operated by the Cherry Valley Iron Company. The United Iron and Steel Company operates the following works:

BLAST FURNACES—2.

Cherry Valley Furnace, Leetonia, Ohio. One stack, 80 x 18; construction commenced June 22, 1904; first blown in November 1, 1904; three Massicks & Crooke stoves, each 85 x 21; fuel, coke; ore, Lake Superior; product, foundry, "Fort Pitt" special car-wheel, and gray forge pig iron; annual capacity, 110,000 tons. Brand, "Cherry Valley." Adding one Massicks & Crooke stove, 85 x 21. (One stack, built in 1868, dismantled in 1904.)—*Active in 1907.*

Fannie Furnace, West Middlesex, Pa. One stack, 70 x 17, built in 1873 and first blown in October 13, 1873; remodeled in 1885 and 1899; torn down and entirely rebuilt in 1903-4; three Massicks & Crooke fire-brick stoves, each 70 x 21; fuel, coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 100,000 tons. Brand, "Fannie." Adding one Massicks & Crooke stove, 70 x 21.—*Active in 1907.*

Total annual capacity of the 2 furnaces: 210,000 gross tons of Bessemer, foundry, special car-wheel, and gray forge pig iron.

IRON-ORE LANDS, COAL LANDS, AND COKE OVENS.

The United Iron and Steel Company owns a controlling interest in the Pittsburgh Iron Ore Company, which owns and operates the Brunt iron-ore mine in the Mesabi Range in Minnesota and leases and operates the Hobart, Nassau, La Rue, and Croxton mines in the same range. These mines have an annual capacity of from 800,000 to 1,000,000 tons. The company also owns 732 acres of undeveloped coking coal lands in Fayette county, Pennsylvania. It also owns 200 bee-hive coke ovens at Leetonia, Ohio, which have an annual capacity of about 120,000 net tons of coke.

THE NATIONAL MALLEABLE CASTINGS COMPANY.

The National Malleable Castings Company; general offices, 7706 Platt ave. S. E., Cleveland; branch offices and selling agencies, Twenty-sixth st., near Western ave., Twenty-fifth st., near West-

ern ave., and Fifty-second ave., (Grant Works,) Chicago; 546 Holmes ave., Indianapolis, Indiana; Front st., Toledo, Ohio; and Sharon, Pa. *General Officers:* Alfred A. Pope, President; E. L. Whittemore, First Vice President; Clayton Mark, Second Vice President; and O. K. Brooks, Secretary and Treasurer.

Capital stock, \$8,000,000, all common. The National Malleable Castings Company operates the following casting plants:

STEEL-CASTING PLANTS—1.

Sharon Works, Sharon, Pa. Built in 1890-1 by the Aschman Steel Casting Company; first steel made June 5, 1891; partly destroyed by fire in 1894 and rebuilt in 1895; purchased by the present company on July 1, 1900, and since greatly enlarged; plant now contains 7 open-hearth furnaces (5 acid and 2 basic); product, steel castings; annual capacity, about 45,000 tons. Fuel, producer gas. Annual capacity of open-hearth steel castings: 45,000 gross tons.

MALLEABLE IRON WORKS.

In addition to the open-hearth steel-casting plant above described the National Malleable Castings Company operates the following malleable iron works:

Cleveland Works, 7706 Platt ave. S. E., Cleveland; Chicago Works, (three plants,) one at Twenty-fifth street, near Western ave., one at Twenty-sixth st., near Western ave., and Grant Works, Fifty-second ave., Chicago; Indianapolis Works, intersection of West Michigan st., Holmes ave., and Peoria division of the C., C., & St. L. Railway, Indianapolis, Indiana; and Toledo Works, Front street, Toledo, Ohio. Product of the 6 works above enumerated, all kinds of malleable iron castings to order.

UNITED ENGINEERING AND FOUNDRY COMPANY.

United Engineering and Foundry Company; general offices, Farmers Bank Building, Pittsburgh. *Officers at Pittsburgh:* Isaac W. Frank, President; G. G. Small, Second Vice President; Charles E. Satler, Secretary; Edward Kneeland, Treasurer; R. W. Tener, Auditor; and H. A. Grusch, Purchasing Agent. *Officer at Youngstown, Ohio:* C. H. Booth, First Vice President.

Capital stock, \$5,500,000, of which \$3,000,000 is 7 per cent. cumulative preferred and \$2,500,000 is common; issued, \$1,933,100 of

preferred and \$2,050,000 of common. The United Engineering and Foundry Company operates the following works:

STEEL-CASTING PLANTS—I.

Chilled Roll Foundry Company Department, Vandergrift, Pa. Built by the Chilled Roll Foundry, Incorporated, in 1900-1; acquired by the United Engineering and Foundry Company on April 1, 1902; two 15-gross-ton Swindell basic open-hearth steel furnaces; first steel made by the former owners on February 4, 1901, and by the present owners on April 1, 1902; product, steel castings; annual capacity, 15,000 tons. Fuel, natural gas. Also makes brass castings, rolls, etc.

Annual capacity: 15,000 gross tons of open-hearth steel castings.

GRAY IRON, BRASS, AND SEMI-STEEL FOUNDRIES.

The United Engineering and Foundry Company also operates the following works, which are equipped for the manufacture of gray iron, brass, and semi-steel castings:

Chilled Roll Foundry Company Department, Vandergrift, Pa.; Frank-Kneeland Machine Company Department, Pittsburgh; Lincoln Foundry Company Department, Pittsburgh; the Lloyd Booth Company Department, Youngstown; McGill & Co. Department, Pittsburgh; and the Oak Street Plant, Youngstown, the latter a part of the Lloyd Booth Department. Product of these works, chilled, sand, and semi-steel rolls, shears, rolling mill machinery, and iron and brass castings; total annual capacity, not including steel castings, 750 tons of brass castings and 60,000 tons of rolls and general castings.

The United Engineering and Foundry Company also operates machine and erecting shops at its McGill & Co. Department.

AMES SHOVEL AND TOOL COMPANY.

Ames Shovel and Tool Company; general offices, Ames Building, Boston. *Officers:* Hobart Ames, President, Charles H. Myers, Vice President, Oliver W. Mink, Treasurer, and William H. Ames, Secretary, Boston; William J. Alford, Vice President, Anderson, Indiana; and Julius C. Birge, Vice President, St. Louis, Missouri.

Capital stock, \$5,000,000, of which \$3,000,000 is preferred and \$2,000,000 is common. The Ames Shovel and Tool Company owns, operates, or controls the following works:

ROLLING MILLS—2.

Elwood Plant, Elwood, Indiana. Buildings erected in 1892 by the Akron Forge Company; plant acquired in 1898 by the Wright Shovel Company and equipped with machinery from that company's former rolling mill at Greenfield, Indiana; first materials rolled in February, 1899; plant acquired by the Ames Shovel and Tool Company from the Wright Shovel Company on August 12, 1901; works now contain 4 heating furnaces, 4 gas producers, and 4 trains of rolls (two 16 and two 22-inch); product, shovel plate; annual capacity, 6,000 tons. Fuel, natural gas and coal. Myers (The H. M.) Company Plant, Beaver Falls, Pa. Rolling mill built in 1883; 8 heating furnaces and 4 trains of 16-inch rolls; product, rolled shovel blanks, all consumed by the company; annual capacity, 2,000 tons. Fuel, coal and coke. (Formerly operated by the H. M. Myers Company.)

Total annual capacity of the 2 rolling mills: 2,000 tons of shovel blanks and 6,000 tons of shovel plate, consumed by the company.

SHOVEL AND HANDLE PLANTS AND COMPANIES.

The Ames Shovel and Tool Company owns or controls the Oliver Ames & Sons Corporation, North Easton, Mass.; T. Rowland's Sons, Incorporated, Cheltenham, Pa.; George Griffiths Company, Philadelphia; the H. M. Myers Company, Beaver Falls, Pa.; the Wright Shovel Company, Anderson, Indiana; and the St. Louis Shovel Company, St. Louis. These companies manufacture shovels, spades, scoops, and drainage tools, for which they have a total annual capacity of 480,000 dozen.

The company also owns or operates handle plants at Paris, Texas; Oakland, Maine; and St. Albans, Maine. These plants make "D" handles and long handles for shovels, spades, scoops, etc.

RAILWAY STEEL-SPRING COMPANY.

Railway Steel-Spring Company; general offices, 71 Broadway, New York; branch offices, Old Colony Building, Chicago; Lincoln Trust Building, St. Louis; Munsey Building, Washington, D. C.; and Pioneer Press Building, St. Paul. *Officers at New York*: Julius E. French, Chairman of Board of Directors; W. H. Silverthorn, President; F. F. Fitzpatrick, Vice President; M. B. Parker, Secretary; Frank Carnahan, Treasurer; and T. L. Chapman, Jr., Assistant Treasurer.

Capital stock, \$27,000,000, of which \$13,500,000 is 7 per cent. cu-

mulative preferred and \$13,500,000 is common. The Railway Steel-Spring Company operates the following plants:

ROLLING MILLS AND STEEL WORKS—2.

Detroit Works, Steel Department, Michigan and Hubbard aves., Detroit. First put in operation in May, 1882; 13 large and 20 small heating furnaces, 3 trains of rolls, (9, 12, and 18-inch,) and 3 hammers; product, merchant steel; annual capacity, 40,000 tons. Spring shops are connected with the works. Fuel, petroleum and coal.

Latrobe Plant, Latrobe, Pa. Built in 1888-9 and put in operation in August, 1889; acquired by present owners on November 16, 1905, taking effect November 1, 1905; 7 heating furnaces, 2 trains of tire rolls, and 3 hammers, (one 1,150-lb., one 7-ton, and one 20-ton.) Open-hearth steel department contains one 30 and two 20-gross-ton acid furnaces; first steel made August 5, 1889; annual capacity, 40,000 tons of ingots. Product, locomotive and car-wheel tires, steel rings, and flanges; annual capacity, 30,000 tons. Fuel, natural gas. Brand, "Latrobe." (Formerly called the Latrobe Works and operated by the Latrobe Steel Company.)

Total annual capacity of the 2 rolling mills and steel works: 40,000 gross tons of open-hearth steel ingots and 70,000 tons of merchant steel, locomotive and car-wheel tires, steel rings, and flanges.

STEEL-SPRING WORKS.

The Railway Steel-Spring Company operates the following steel-spring works: Detroit Works, Michigan and Hubbard aves., Detroit; French Works, Liberty ave. and Twentieth st., Pittsburgh; National Works, Oswego, N. Y.; Scott Works, Germantown ave. and New Market st., Philadelphia; and St. Louis Works, Lansdowne, East St. Louis, Illinois. These works produce elliptical and coil springs for locomotive, passenger, and freight equipment; they also manufacture machinery springs, etc. Total annual capacity of the 5 works, 100,000 gross tons of springs.

STEEL-TIRED WHEEL WORKS.

The company also operates the following steel-tired wheel works: Denver Works, Denver, Colorado; Depew Works, Depew, New York; Hudson Works, Hudson, New York; Pullman Works, Pullman, Illinois; and Scranton Works, Scranton, Pennsylvania. Product, steel-tired engine, truck, tender, coach, and motor wheels. Total annual capacity of the 5 works, about 69,500 steel-tired wheels.

THE YOUNGSTOWN SHEET AND TUBE COMPANY.

The Youngstown Sheet and Tube Company (formerly called the Youngstown Iron Sheet and Tube Company); general offices, Youngstown, Ohio. *Officers at Youngstown:* J. A. Campbell, President; C. S. Robinson, Second Vice President; George E. Day, Secretary and General Sales Manager; Richard Garlick, Treasurer; W. B. Jones, Auditor; E. G. Murray, Purchasing Agent; and William C. Reilly, General Superintendent. *Officer at Cleveland:* H. G. Dalton, First Vice President, Western Reserve Building.

Sales Agencies: 1733 Land Title Building, Philadelphia; 92 William st., New York; 1145-46 Marquette Building, Chicago; 21 Pearl st., Boston; Farmers Bank Building, Pittsburgh; 604 Mission st., San Francisco; Mercantile Building, Denver; and Rogersville, Tenn. Capital stock, \$6,000,000, all common. The company operates the following blast furnaces, rolling mills, steel works, etc.:

BLAST FURNACES—1 COMPLETED, 2 BUILDING, AND 2 PROJECTED.

Alice Furnace, Sharpsville, Pa. One stack, 75 x 144, built in 1868, put in operation in October, 1868, remodeled in 1882 and 1890, rebuilt in 1894, and again remodeled in 1897; four iron pipe stoves; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, malleable, and mill pig iron; annual capacity, 90,000 tons. Brand, "Alice."—*Active in 1907.*

Furnaces A and B, Youngstown, Ohio. Building; 2 stacks, each 88 x 22; construction commenced June 1, 1907; eight Kennedy centre-combustion hot-blast stoves, each 100 x 22; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; estimated total annual capacity, 360,000 tons. Molten metal from these furnaces will be used in the company's Bessemer converters at Youngstown. Two additional furnaces may be built.—*Furnace A will probably be ready for blast in June and Furnace B in July, 1908.*

Total annual capacity of the completed furnace, 90,000 gross tons; of the 2 building furnaces, 360,000 tons: total, 450,000 tons.

ROLLING MILLS AND STEEL WORKS—1.

Rolling Mill Department, Youngstown. Built in 1901-2 and enlarged in 1905-6; puddle and sheet mills first put in operation in February, 1902, skelp mills in December, 1902, blooming mill August 22, 1906, sheet bar mill September 20, 1906, and uni-

versal mill September 30, 1906; rolling mill department is now equipped with 25 double puddling furnaces, 6 heating furnaces, 5 annealing furnaces, 2 trains of 20-inch muck rolls, one train of 20-inch skelp rolls, 6 hot sheet mills, (four 36 x 38, one 26 x 44, and one 26 x 50-inch,) 3 cold mills, (two 24 x 44 and one 24 x 52-inch,) one 40-inch blooming mill arranged to roll 4 x 4 to 30 x 6-inch billets and slabs, one 18-inch continuous billet mill, one 18-inch continuous sheet bar mill, one 10-inch continuous Morgan skelp and hoop mill, and one 2-high 42-inch universal mill. Bessemer Steel Works; built in 1905-6 and first blow made August 22, 1906; two 10-gross-ton converters with an annual capacity of 600,000 tons of ingots, 5 cupolas, and five 4-hole soaking pits. Two 300-ton metal mixers will be added and molten metal used in the Bessemer converters when the blast furnaces are completed. Product, ingots, blooms, slabs, billets, sheet bars, skelp, hoops, universal plates, muck and scrap bars, and black and galvanized sheets. Fuel, coal and coke.

Annual capacity: 600,000 tons of ingots, 540,000 tons of blooms, slabs, billets, and sheet bars, 30,000 tons of muck and scrap bars, 30,000 tons of black sheets, 24,000 tons of galvanized sheets, 18,000 tons of painted and corrugated roofing, 100,000 tons of universal plates, 180,000 tons of skelp, 180,000 tons of black pipe, 21,000 tons of galvanized pipe, and 500 tons of gray iron castings.

WROUGHT PIPE, GALVANIZED SHEET, AND OTHER WORKS.

Youngstown Works, Youngstown. Number of butt-welding furnaces, 3; of lap-welding furnaces, 1; of galvanizing pots or tanks, 2; product, wrought iron and steel pipe; first pipe made in July, 1902; sizes, from $\frac{3}{8}$ of an inch to 12 inches in diameter; annual capacity, 180,000 tons of black and 21,000 tons of galvanized pipe. A plant for the manufacture of galvanized sheets is also connected with the Youngstown Works; number of galvanizing pots, 3; product, all gauges and sizes of galvanized sheets; annual capacity, 24,000 tons. Also a plant for the manufacture of painted and corrugated roofing; annual capacity, 18,000 tons. Also a gray iron foundry for the manufacture of mill castings for the use of the company; annual capacity, 500 tons.

COAL AND IRON-ORE LANDS.

The company owns 1,348 acres of undeveloped coal lands in Greene county, Pa. It also owns three-fifths of the capital stock of the Crete Mining Company, which owns 260 acres of land in the Mesabi Range and operates the Albany, Utica, and Troy mines, which have an annual capacity of 1,000,000 tons of iron ore.

STANDARD CHAIN COMPANY.

Standard Chain Company; general offices, Bailey Farrell Building, Pittsburgh. *Officers at Pittsburgh:* John C. Schmidt, President; Robert Garland, Vice President; Arthur E. Crockett, Secretary and General Manager; W. R. Dawson, General Sales Agent; and William Robertson, Treasurer.

Capital stock, \$800,700, of which \$515,700 is preferred and \$285,000 is common. The company operates the following works:

ROLLING MILLS—1.

Columbus Iron Works, Columbus, Ohio. Built in 1854; 2 single and 7 double puddling furnaces, 4 heating furnaces, and 5 trains of rolls (one muck and one 8, one 10, one 12, and one 17-inch finishing); product, merchant bars, light T rails, and iron for harness and saddlery work and chains; annual capacity, 25,000 tons. Fuel, coal, producer gas, and oil gas.

Annual capacity: 25,000 gross tons of finished rolled products.

IRON AND STEEL CHAIN AND FORGING WORKS.

Carlisle Chain Works, Gettysburg Junction, Pa. Product, coil, cable, trace, fancy, and other chains; sizes, from $\frac{1}{8}$ of an inch to 1 inch. Also make light forgings for railroad cars.

Krein Chain Works, Marion, Indiana. Product, oil-welded, proof-tested coil, log, boom, dredge, and other chains; sizes, from $\frac{1}{8}$ of an inch to 1 inch. Also make light forgings for railroad cars.

Krein Chain Works, St. Marys, Ohio. Product, coil, trace, and fancy chains; also German coil chains; sizes, from $\frac{1}{8}$ of an inch to 1 inch. Also make light forgings for railroad cars.

Nes Chain Works, York, Pa. Product, all kinds of welded chains; sizes, from No. 10 Stubbs' wire gauge to 1-inch cable.

P. Hayden Saddlery Hardware Company's Chain Works Department, Columbus, Ohio. Product, coil, trace, stud, and other chains; sizes, from $\frac{1}{8}$ of an inch to 2 $\frac{1}{2}$ inches. Also makes light forgings for railroad cars.

Standard Chain Company, Braddock, Pa. Product, coil, cable, wagon, conveyor, hand-made, and shackle chains; sizes, from $\frac{1}{8}$ of an inch to 2 $\frac{1}{2}$ inches. Also makes light forgings for railroad cars.

York Chain Works, York, Pa. Product, coil, cable, trace, and other chains; sizes, from No. 8 wire to 1-inch cable. Also make light iron and steel forgings for railroad cars.

A chain plant is also being erected at Sarnia, Ontario, Canada.

LA BELLE IRON WORKS.

La Belle Iron Works; general offices, Steubenville, Ohio; branch offices, Wheeling, W. Va. *Officers at Steubenville:* Isaac M. Scott, President; W. D. Crawford, Vice President and General Manager; H. D. Westfall, Secretary and General Manager of Sales; and R. C. Kirk, Treasurer.

Selling Agencies: A. Schroeder, 39 Cortlandt st., New York; R. M. Baily & Co., Arcade Building, Philadelphia; H. L. Green & Co., Ogden Building, Chicago; F. A. Goodrich, Chemical Building, St. Louis; Charles W. Pike & Co., 9 Mission st., San Francisco; J. R. Bowles, 209 Stark st., Portland, Oregon; A. Milne & Co., 9 Oliver st., Boston; Ely and Williams Company, 257 Broadway, New York; Edmund W. Mudge & Co., Frick Building, Pittsburgh; F. A. Goodrich & Co., Penobscot Building, Detroit; and D. M. Montgomery, Tulane-Newcomb Building, New Orleans.

Capital stock, \$7,500,000. The company operates these works:

BLAST FURNACES—2.

La Belle Furnaces, Steubenville, Ohio. Two stacks: No. 1, 90 x 20, originally built in 1865 and rebuilt in 1889; torn down and rebuilt in 1901-3; pig iron first made at the rebuilt stack April 28, 1903; No. 2, 90 x 20, built in 1903-4 and first blown in October 31, 1904; each furnace has four Massicks & Crooke stoves, each 85 x 21; fuel, Connellsville coke; ore, Lake Superior; product, basic and foundry pig iron; annual capacity, 300,000 tons. Molten metal from these furnaces is used in the company's open-hearth steel furnaces.—*Both active in 1907.*

ROLLING MILLS AND STEEL WORKS—2.

Steubenville Works, Steubenville, Ohio. Originally built in 1855; purchased from the Receiver of the Jefferson Iron Works in 1899; old plant entirely dismantled and rebuilt in 1899-1903. Equipment now consists of one 24-inch continuous universal plate and skelp mill, with 2 continuous gas heating furnaces, built in 1899; two 18-inch skelp mills, with 2 continuous gas heating furnaces, built in 1901-2; ten 50-gross-ton basic open-hearth steel furnaces with 16 soaking pits (nine built in 1901-2 and one in 1907); first steel made July 26, 1902; one 46-inch combined blooming and billet mill built in 1901-2 and first blooms rolled July 26, 1902; one 30 x 84-inch plate mill, with one continuous Laughlin heating furnace and automatic discharger, built in 1905 and first plates rolled August 7, 1905. Fuel, natural gas, producer gas, and bituminous

coal. Adding 2 jobbing mills (one 60 and one 54-inch) and 8 sheet mills (two 44, four 38, and two 32-inch); product, blue annealed plates from $\frac{1}{16}$ of an inch to No. 18 gauge and black sheets from No. 10 to No. 30 gauge; estimated annual capacity, 60,000 tons of plates and 40,000 tons of sheets. Also adding one 72-inch 3-high plate mill with an annual capacity of 50,000 tons, 6 regenerative gas heating furnaces, one 4-hole soaking pit, and one 250-ton metal mixer. Also one 24 x 54 and two 24 x 46-inch cold-rolling mills, a galvanizing plant, and a roofing plant. Molten metal from the La Belle Furnaces is now used in the open-hearth steel furnaces; when the mixer is completed molten metal will be taken from the blast furnaces to the mixer and thence conveyed in ladles to the open-hearth furnaces.

Wheeling Works, Wheeling, W. Va. Built in 1852 and enlarged since; incorporated December 3, 1875; 4 regenerative gas heating furnaces, one 3-high 22-inch nail-plate, one 2-high 21-inch nail-plate or skelp mill, and 173 cut-nail machines. Fuel, natural gas. Product and total annual capacity of the 2 works, including the additions to the Steubenville Works: 390,000 gross tons of open-hearth steel ingots and slabs, 120,000 tons of universal plates, 120,000 tons of flat bars, skelp, and special plates, 35,000 tons of blue annealed plates, 35,000 tons of box annealed plates, 110,000 tons of sheared plates, 40,000 tons of black sheets, 300,000 kegs of cut nails, 100,000 tons of wrought pipe, 7,500 tons of iron and steel castings, and 12,000 tons of galvanized pipe. Brand, "La Belle."

CUT-NAIL WORKS, PIPE WORKS, MINES, ETC.

Wheeling Works, Wheeling, W. Va. Number of cut-nail machines, 173; sizes, from $\frac{3}{4}$ of an inch to 8 inches; annual capacity, 300,000 kegs of steel cut nails.

Steubenville Works, Steubenville. Product, steel lap and butt welded pipe from $\frac{1}{4}$ of an inch to 12 inches; annual capacity, 100,000 tons. Also iron and steel general mill castings; annual capacity, 7,500 tons. Also galvanized pipe; annual capacity, 12,000 tons.

The La Belle Iron Works control the Pitt Iron Mining Company, of Steubenville, which operates the Wacootah, La Belle, and Miller iron-ore mines in Minnesota. They also own 2,300 acres of coal lands in Brooke, Jefferson, Randolph, and Ohio counties, W. Va., and in Fayette county, Pa. The lands in Randolph county are undeveloped, but coal is mined in all of the other counties named. They control the La Belle Coke Company, which operates 200 bee-hive coke ovens in Fayette county, Pa., with an annual capacity of 100,000 tons. They also own 99 acres of undeveloped limestone property in Berkeley county, W. Va.

THE UNITED SHEET AND TIN PLATE COMPANY.

The United Sheet and Tin Plate Company, with general offices at Marietta, Ohio, formerly operated the rolling mills and tinplate works which are described below. On August 27, 1907, the plants were sold by Special Master Commissioners to E. Cooper Shapley, Stephen Girard Building, Philadelphia. Two new companies may be organized and the plants put in operation.

ROLLING MILLS AND STEEL WORKS—2 COMPLETED AND 1 PARTLY BUILT.

Byesville Works, Byesville, Guernsey county, Ohio. Foundations for one 50-gross-ton Siemens basic open-hearth steel furnace partly built in 1903 by the Cambridge-Byesville Steel Company; acquired by the United Sheet and Tin Plate Company in that year; work suspended in 1903. Fuel to be used, natural gas.

Marietta Works, Marietta, Ohio. Built in 1902-3 and first put in operation April 15, 1903; 4 sheet, 4 pair, and 4 annealing furnaces, one stand of 28-inch and 3 stands of 32-inch hot black plate mills, and 4 stands of 36-inch cold mills; product, black plates for tinning, polished steel, and various specialties; annual capacity, 12,000 tons of black plates. Also make tinplates and terne plates. Fuel, natural gas and bituminous coal.

Tuscora Works, New Comerstown, Tuscarawas county, Ohio. Built in 1901-2 and first put in operation March 12, 1902; 4 sheet furnaces, 4 pair furnaces, 4 annealing furnaces, and 7 sheet mills (two 38, one 40, and one 52-inch hot and two 40 and one 50-inch cold); product, polished, galvanized, and corrugated sheets and black plates for tinning; annual capacity, 13,000 tons. Brand, "Tuscora." Fuel, coal and manufactured gas. A plant for the manufacture of eave troughs, conductor pipe, ridge rolls, and patent ceiling is connected with the works.

Total annual capacity of the 2 completed mills: 25,000 tons of polished, galvanized, and corrugated sheets and black plates for tinning.

TINPLATE AND TERNE PLATE WORKS.

Marietta Works, Marietta, Ohio. Built in 1902-3 and first tin and terne plates made in May, 1903; 9 sets, 3 for tinplates and 6 for terne plates; weekly capacity, 900 boxes of tinplates and 1,800 boxes of terne plates. Fuel, natural gas and bituminous coal. Make black plates.

THE AMERICAN ROLLING MILL COMPANY.

The American Rolling Mill Company; general offices, Middletown, Ohio; branch offices, Zanesville, Ohio; Frick Building, Pittsburgh; Rookery Building, Chicago; and 85-87 John st., New York. *Officers at Middletown:* George M. Verity, President; R. C. Phillips, Secretary; and W. H. Longenecker, Treasurer. *Officer at Zanesville:* W. T. Simpson, Vice President. *Selling Agents:* Goff, Horner & Co., Frick Building, Pittsburgh; W. E. Stockton, Rookery Building, Chicago; and Denman & Davis, 85-87 John st., New York. Capital stock, \$1,400,000, of which \$600,000 is 6 per cent. cumulative preferred and \$800,000 is common. The American Rolling Mill Company operates the following rolling mills and steel works:

ROLLING MILLS AND STEEL WORKS—2.

Middletown Branch, Middletown, Ohio. Built in 1900-1 and first put in operation February 7, 1901; 8 gas-fired heating furnaces, (4 sheet and 4 pair,) one single annealing furnace, 5 double annealing furnaces, 2 bar reheating furnaces, two 21-inch bar mills, (one 2-high and one 3-high,) 4 finishing mills, (26 x 38 and 26 x 44-inch,) and 2 cold mills; two 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 50,000 tons of ingots; first steel made February 7, 1901; product, steel ingots, billets, sheet bars, black and galvanized sheets, corrugated iron, and sheet steel building materials of all kinds; annual capacity, 40,000 tons of bars and 16,000 tons of sheets. Fuel, coal and producer and natural gas. (Formerly operated by the American Rolling Mill Company.)

Muskingum Branch, Zanesville, Ohio. Built in 1900-1 and first put in operation in October, 1901; 6 combination sheet and pair furnaces, 6 double annealing furnaces, 6 stands of hot sheet rolls, (26 x 38, 26 x 44, and 26 x 48-inch,) 2 stands of 26 x 44-inch roughing rolls, and 3 stands of 26 x 44-inch cold rolls; product, Bessemer and open-hearth steel sheets, special analysis armature sheets, corrugated and various other styles of sheet metal roofing, pressed brick siding, weather boarding, etc.; sole manufacturers of Kuhne's patent truss metal laths; annual capacity, triple turn, 19,000 tons. Fuel, natural gas. (Formerly operated by the Muskingum Valley Steel Company; acquired by the American Rolling Mill Company on July 1, 1905.)

Total annual capacity of the 2 rolling mills and steel works: 50,000 tons of open-hearth ingots and castings, 40,000 tons of bars, and 35,000 tons of sheets, pressed brick siding, weather boarding, etc.

STEEL FOUNDRY AND GALVANIZING PLANT.

The American Rolling Mill Company operates a steel foundry at Middletown; product, open-hearth steel castings for its own use. It also operates a galvanizing plant at Middletown, Ohio, which is equipped with 2 galvanizing pots; product, "Miami" refined galvanized sheets; annual capacity, 5,000 gross tons.

THE WELLMAN-SEEVER-MORGAN COMPANY.

The Wellman-Seever-Morgan Company; general offices, Central ave., cor. of East 71st st., Cleveland, Ohio; branch offices, 42 Broadway, New York; 604 Mission st., San Francisco; Apartado No. 1571, City of Mexico, D. F. *Officers:* Willard N. Sawyer, President and General Manager; S. T. Wellman, Chairman; S. H. Pitkin, First Vice President; G. H. Hulett, Second Vice President; W. H. Cowell, Secretary and Treasurer; W. A. Stadelman, General Manager of Sales; and C. A. Boyd, Manager of Works. *Selling Agent:* The Hendrie and Bolthoff Manufacturing and Supply Company, Denver, Colorado.

This company was formed by the consolidation in April, 1903, of the Wellman-Seever-Morgan Engineering Company, of Cleveland, and the Webster, Camp, and Lane Company, of Akron, Ohio.

Capital stock, \$2,700,000, of which \$700,000 is 7 per cent. cumulative preferred and \$2,000,000 is common. The Wellman-Seever-Morgan Company operates the works described below:

STEEL-CASTING WORKS—1.

Steel Casting Department of the Wellman-Seever-Morgan Company, Cleveland. Built in 1902-3; one 20-gross-ton basic open-hearth furnace; first steel made January 29, 1903; product, steel castings; annual capacity, 7,500 tons. Fuel, natural gas and oil. Annual capacity: 7,500 gross tons of open-hearth steel castings.

SPECIAL MACHINERY, SLAG CARS, ORE BRIDGES, ETC.

Akron Works, Akron, Ohio. Product, mining and hoisting machinery, Hulett patented ore-handling apparatus, turbine water wheels, Corliss engines, Forter water sealed valves, etc.

Cleveland Works, Central ave. and East Seventieth to East Seventy-first sts., Cleveland. Product, machinery for iron and steel works, slag cars, bridges for handling ore and coal, Wellman patented charging apparatus, electric cranes, mechanical and hand-poked gas producers, coke oven machinery, ore-handling machinery, etc.

WHITAKER-GLESSNER COMPANY.

Whitaker-Glessner Company; general offices, Wheeling, West Virginia. *Officers*: N. E. Whitaker, President; William L. Glessner, Vice President; and A. C. Whitaker, Secretary and Treasurer. Capital stock authorized, \$3,000,000, all common, of which \$2,000,000 has been paid in. The Whitaker-Glessner Company operates or controls the rolling mills and other works described below:

ROLLING MILLS—2.

- Crescent Iron Works, (Whitaker Department,) Wheeling, W. Va. Built in 1855; partly destroyed by fire in 1893 and remodeled and rebuilt in 1894; 5 double puddling furnaces, 3 bar and 22 sheet heating furnaces, and 19 trains of rolls (one 18-inch muck, one 18-inch bar, four 24 and three 26-inch sheet, and two 22 and three 24-inch black plate, all hot, and five 22-inch cold); product, iron and steel sheets, black plates for tinning, and galvanized sheets; annual capacity, 35,000 tons. Fuel, bituminous coal and natural gas, chiefly natural gas. Brand, "Crescent."
- Martins Ferry Department, Martins Ferry, Ohio. Nail factory built in 1872-3; first keg of nails made March 4, 1873; works destroyed by fire August 8, 1881, and immediately rebuilt; machinery dismantled in 1907; buildings now used by the Wheeling Corrugating Company. Sheet department added in 1901; 6 sheet furnaces, 3 annealing furnaces, 6 pair furnaces, and 8 sheet mills (four 26 x 38 and two 26 x 44-inch hot and two 26 x 44-inch cold); product, sheets; annual capacity, 15,000 tons. Fuel, coal and producer gas. Brand, "Laughlin." (Formerly called the Laughlin Department.) Total annual capacity of the 2 rolling mills: 50,000 tons of iron and steel sheets, black plates for tinning, and galvanized sheets.

TINPLATE AND TERNE PLATE WORKS.

- Wheeling Corrugating Company, Wheeling, W. Va. (Controlling interest owned by the Whitaker-Glessner Company.) Warehouses in New York, Philadelphia, Boston, Chicago, St. Louis, and Chattanooga. Built in 1895; first tin and terne plates made in the spring of 1895; 12 sets for either tin or terne plates; weekly capacity, double turn, 4,000 boxes of tin and terne plates. Fuel, natural gas. Black plates supplied by the Whitaker-Glessner Company. N. E. Whitaker, President; H. C. Whitaker, Vice President; A. C. Whitaker, Treasurer; Alex. Glass, Secretary; and N. P. Whitaker, Manager.

GALVANIZING, METAL-CEILING, AND OTHER WORKS.

The Wheeling Corrugating Company, of Wheeling, W. Va., the controlling interest of which is owned by the Whitaker-Glessner Company, operates two plants for the manufacture of galvanized sheets, galvanized and painted roofing, galvanized and tinned shingles, conductor pipes, eave troughs, tin roofing, valleys and gutters, nested stove pipe, embossed steel ceilings and sidewalks, buckets, tubs, coal hods, stove pipe, elbows, etc. One plant is located at Wheeling, West Va., and the other at Martins Ferry, Ohio.

WHEELING STEEL AND IRON COMPANY.

Wheeling Steel and Iron Company; general offices, Wheeling, West Virginia. *Officers:* C. R. Hubbard, President; Frank W. Bowers, Secretary; W. H. Higgins, Assistant Secretary and Treasurer; H. G. Tinker, General Sales Agent; and Charles J. Hunter, Purchasing Agent.

Capital stock, \$4,995,400, all common. The Wheeling Steel and Iron Company operates the following blast furnaces, rolling mills, tube mills, cut-nail and cut-spike works, foundries, quarries, etc.

BLAST FURNACES—3.

Belmont Furnace, Wheeling, W. Va. One stack, 70 x 16, built in 1874 and blown in September 4, 1875; remodeled in 1893; three Gordon fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and gray forge pig iron; annual capacity, 75,000 tons. Brand, "Belmont."—*Active in 1907.*

Martins Ferry Furnace, Martins Ferry, Ohio. One stack, originally built in 1866; old stack torn down in 1903 and an entirely new stack, 80 x 18, built on the site of the old furnace in 1903-5; rebuilt furnace blown in August 31, 1905; four Massicks & Crooke stoves, each 75 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 100,000 tons. Brand, "Martins Ferry."—*Active in 1907.*

Top Furnace, Wheeling, W. Va. One stack, 80 x 18, built in 1873-4; blown in October 3, 1878; remodeled in 1888 and rebuilt in 1894; three Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 100,000 tons. Brand, "Top Mill." (Formerly called Top Mill Furnace.)—*Active in 1907.*

Total annual capacity of the 3 furnaces: 275,000 gross tons of Bessemer and gray forge pig iron.

ROLLING MILLS AND STEEL WORKS—4.

Belmont Works, Wheeling, W. Va. Built in 1849; 3 regenerative gas heating furnaces, 2 continuous and 3 direct heating furnaces, 4 forge fires, 3 trains of rolls, (one 16-inch, one 2-high 22-inch, and one continuous 22-inch,) and 50 cut-nail machines; product, grooved skelp and nails made from soft steel slabs rolled by the company; annual capacity, 120,000 tons of skelp and 120,000 kegs of cut nails. Fuel, bituminous coal and natural gas. Brand, "Belmont."

Benwood Works, Benwood, W. Va. Built in 1852, burned in 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 3 gas heating furnaces, and 2 trains of rolls (one muck and one 3-high skelp); product, muck bar and iron and steel skelp; annual capacity, 21,000 tons of muck bar and 45,000 tons of iron and steel skelp. Fuel, bituminous coal.

Top Mill, Wheeling, W. Va. Built in 1867 and rebuilt in 1872; 8 single puddling furnaces, 6 gas heating furnaces, 2 softening and 2 annealing furnaces, 130 cut-nail machines, and 3 trains of rolls (double muck and nail-plate and one 22-inch sheet train with 2 mills); product, iron and steel sheets and steel cut nails and spikes; annual capacity, 8,000 tons of sheets and 300,000 kegs of nails and spikes. Fuel, bituminous coal and natural gas. Brand, "Top Mill."

Wheeling Steel Works, Benwood, W. Va. Bessemer steel works built in 1885-6; first blow made August 12, 1886; two 6-gross-ton converters with an annual capacity of 190,000 tons of ingots, 2 soaking pits, and one 2-high 36-inch blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 180,000 tons. Fuel, coal and natural gas. Brand, "W. S. W."

Total annual capacity of the 4 rolling mills and steel works: 190,000 gross tons of Bessemer steel ingots, 180,000 tons of steel nail slabs, blooms, and billets, 173,000 tons of skelp and sheets, 21,000 tons of muck bar, and 420,000 kegs of cut nails and cut spikes.

CUT-NAIL AND CUT-SPIKE WORKS.

Belmont Works, Wheeling, West Virginia. Number of cut-nail machines, 50; sizes of nails, from 2-penny to 60-penny; annual capacity, 120,000 kegs.

Top Mill, Wheeling, West Virginia. Product, cut nails and spikes. Number of cut-nail machines, 130; sizes of nails, from 2-penny to 60-penny; annual capacity, 288,000 kegs. Number of spike machines, 3; sizes of spikes, from 6 to 8 inches, for driving in wood; annual capacity, 12,000 kegs of 100 lbs.; railroad spikes not made.

IRON FOUNDRY, TUBE MILL, AND GALVANIZING PLANT.

Belmont Foundry, Wheeling, W. Va. Product, general mill castings of gray iron; annual capacity, 1,200 tons.

Benwood Tube Works, Benwood, W. Va. Built in 1902; 2 lap-weld and 2 butt-weld furnaces; product, wrought iron and steel tubes; sizes, from $\frac{1}{4}$ of an inch to 16 inches; annual capacity, 100,000 tons.

A galvanizing plant is connected with the Benwood Tube Works, at Benwood, W. Va. Built in 1905; number of galvanizing pans, 1; product, galvanized pipe; annual capacity, 15,000 net tons.

LIMESTONE QUARRIES, COAL LANDS, ETC.

The Wheeling Steel and Iron Company owns a one-third interest in the Bessemer Limestone Company, of Youngstown, Ohio. It also owns 500 acres of coal lands near Benwood and Wheeling, in West Virginia, with an annual capacity of 150,000 tons.

It owns the stock of the Wheeling Coke Company, which has 1,000 acres of undeveloped coking coal lands in Fayette county, Pa.

VIRGINIA IRON, COAL, AND COKE COMPANY.

Virginia Iron, Coal, and Coke Company; general offices, Bristol, Tennessee. *Officers at Bristol:* John B. Newton, Vice President and General Manager; John W. Cure, Secretary and Treasurer; W. B. Bowles, Auditor; C. W. Owen, General Sales Agent; and William N. Morgan, Purchasing Agent. *Officers at New York:* Henry K. McHarg, President, and C. B. Colebrook, Assistant Secretary, 40 Wall street.

Selling Agents: For coke pig iron: N. S. Bartlett & Co., 126 State st., Boston, 17 Battery Place, (Whitehall Building,) New York, and Harrison Building, Philadelphia; and Hickman, Williams & Co., Rookery Building, Chicago, German National Bank Building, Pittsburgh, Union Trust Building, Cincinnati, American National Bank Building, Louisville, and Commonwealth Trust Building, St. Louis. For charcoal pig iron: R. C. Hoffman & Co., Continental Trust Building, Baltimore.

Capital stock authorized, \$10,000,000, all outstanding. Bonded indebtedness, \$5,998,000. The company operates these works:

BLAST FURNACES—9 COKE AND 2 CHARCOAL STACKS.

Bristol Furnace, Bristol, Tennessee. Furnace built on the Virginia side of the State line in Washington county. One stack, 75 x 18, built in 1890-1; first iron made October 24, 1891; one 2-pass and

three 4-pass Whitwell stoves; fuel, Looney Creek and Stonega coke; ores, Ducktown, Doe Mountain, and Haskell; product, foundry, forge, and basic pig iron; annual capacity, 50,000 tons. Brand, "Bristol."—*Active in 1907.*

Crozer Furnaces, Roanoke, Virginia. Two stacks: No. 1 Furnace, 70 x 17½, built in 1882-3 and first put in operation May 29, 1883; four 60 x 18 two-pass stoves; No. 2 Furnace, 70 x 16½, built in 1889 and blown in October 19, 1889; three 60 x 18 four-pass Whitwell stoves and one 60 x 18 two-pass stove; fuel, Tom's Creek and Pocahontas coke; ores, Virginia limonite, mountain, and specular; product, foundry, forge, and basic pig iron; total annual capacity, 100,000 tons. Brand, "Crozer." Basic iron cast in chilled moulds.—*Both active in 1907.*

Dora Furnace, Pulaski City, Virginia. One stack, 75 x 18, built in 1891-2 and blown in in May, 1892; one 75 x 18 two-pass stove and three 60 x 20 four-pass Whitwell stoves; fuel, Tom's Creek and Pocahontas coke; ores, limonite and mountain; product, foundry and forge pig iron; annual capacity, 50,000 tons. Brand, "Dora."—*Active in 1907.*

Fosters Falls Furnace, Fosters Falls, Virginia. Furnace on the Cripple Creek branch of the Norfolk and Western Railway. One stack, built in 1881, abandoned in 1896, and revived and blown in in August, 1903; height increased 16 feet in 1906; present size, 50 x 10; closed top; cold blast; fuel, charcoal; ore, Sanders limonite; product, cold-blast charcoal pig iron for the manufacture of chilled rolls; annual capacity, 3,000 tons.—*Active in 1907.*

Graham Furnace, Graham, Virginia. One stack, 70 x 15, built in 1890 and blown in December 12, 1891; three Whitwell stoves; fuel, Pocahontas coke; ores, local hematite and Lake Superior; product, foundry and basic pig iron; annual capacity, 40,000 tons. Brand, "Graham." (Formerly operated under lease by the Graham Iron Company.)—*Last active in 1904; may resume in 1908.*

Max Meadows Furnace, Max Meadows, Va. One stack, 75 x 20, built in 1890-1; first blown in November 19, 1895; rebuilt in 1899; one 70 x 20 two-pass and three 60 x 20 four-pass Whitwell stoves; fuel, Tom's Creek and Pocahontas coke; ores, Virginia limonite and mountain; product, foundry, forge, and basic pig iron; annual capacity, 60,000 tons. Brand, "Max Meadows."—*Active in 1907.*

Radford-Crane Furnace, Radford, Virginia. One stack, 75 x 17, begun in 1890 and completed in 1892; first blown in in December, 1899; rebuilt in 1906-7; four 4-pass Kennedy brick stoves; fuel, Tom's Creek and Pocahontas coke; ores, Virginia limonite and mountain; product, foundry and forge pig iron; annual capacity, 75,000 tons. Brand, "Radford."—*Active in 1907.*

Reed Island Furnace, Reed Island, Va. Furnace in Pulaski county on the Reed Island branch of the Norfolk and Western Railway. One stack, 39 x 11, put in blast April 28, 1881; cold blast; water-power; open top; fuel, charcoal; ore, local limonite; product, cold-blast charcoal pig iron; annual capacity, 3,000 tons. Brand, "Reed Island."—*Active in 1907.*

Watts Furnaces, Middlesborough, Kentucky. Two stacks, one, 74½ x 16½, and one, 74½ x 17, built in 1889-91; one stack blown in February 10 and the other March 10, 1893; seven 4-pass Whitwell stoves; fuel, Looney Creek and Tom's Creek coke; ores, Ducktown, Ben Hur, Truro, Bronco, and Cumberland Gap; product, foundry and forge pig iron; total annual capacity, 110,000 tons. Brand, "Watts."—*One furnace active in 1907.*

Total annual capacity of the 11 furnaces: 491,000 gross tons.

ROLLING MILLS—1.

Crescent Rolling Mills, Bristol, Va.-Tenn. Works originally built at Max Meadows, Virginia; part of machinery removed to Bristol in the fall of 1905; construction commenced on the Virginia side of the State line on November 1, 1905, and first put in operation in June, 1906; 10 double puddling furnaces, 5 heating furnaces, 2 forge fires, and 3 trains of rolls (one 9, one 12, and one 18-inch); product, merchant bar iron; annual capacity, 20,000 tons. Fuel, coal.

CARBUILDING AND CAR-WHEEL WORKS, ETC.

Dora Car Shops, Pulaski, Virginia. Product, wooden coal and iron-ore cars; annual capacity, 2,500 cars.

Dora Foundry, Pulaski, Virginia. Product, self-oiling tram car wheels; annual capacity, 25,000 wheels. Also makes gray iron castings; annual capacity, 3,000 tons. Operates a machine shop.

IRON-ORE MINES AND LIMESTONE QUARRIES.

The company owns or operates under lease the following iron-ore mines: The Barren Springs mines, the Morris mines, and the Swecker mines at Barren Springs, Va.; the Burra Burra mines, the Eureka mines, the Isabella mines, and the London mines at Isabella, Tenn.; the Bronco mines and the Chamberlain mines at Bronco, Ga.; the Ben Hur mines and the Truro mines at Ben Hur, Va.; the Cedar Run mines, the Foster Falls mines, the Hematite mines, the Posey mines, the Sanders mines, and the Walton mines at Fosters Falls, Va.; the Crawford mines, the Hurst mines, the Reed Island mines, and the Rich Hill mines at Reed Island, Va.; the Crozer mines, the Crozer specular mines, the Dewey specular mines, the Edith specular mines, the

Grubb specular mines, the Grubb mines, and the Ironville specular mines at Blue Ridge, Va.; the Flint Knob mines at Vaughtsville, Tenn.; the Little Wythe mines at Cripple Creek, Va.; the Locust Hill mines and the Clark's Summit mines at Max Meadows, Va.; the Rorer mines and the Trout mines at Roanoke, Va.; the Betty Baker mines at Sylvatus, Va.; the Taylor mines at Carter, Tenn.; and the Murray mines at Troutville, Va. Total annual capacity of the iron-ore mines: 650,000 gross tons.

It also owns or operates under lease the following limestone quarries: The Buchanan and Sexton quarries at Buchanan, Va.; the Gate City quarry at Gate City, Va.; the Carr quarry at Arthur, Tenn.; and the Ardway quarry at Barren Springs, Va. Total annual capacity of the limestone quarries: 180,000 gross tons.

COKE OVENS AND COAL LANDS.

The company has 800 coke ovens at Tom's Creek, Va., with an annual capacity of 350,000 net tons. It also has 174 coke ovens at Looney Creek, Va., with an annual capacity of 78,000 net tons. Total annual capacity of the 974 ovens: 428,000 net tons.

It also owns about 122,000 acres of coal lands, including the Looney Creek coal mines in Wise county, Virginia, formerly operated by the Virginia, Tennessee, and Carolina Steel and Iron Company. The annual capacity of the coal mines of the Virginia Iron, Coal, and Coke Company is about 650,000 tons of commercial coal and 715,000 tons of slack, the latter shipped to coke ovens.

ALLEGHANY ORE AND IRON COMPANY.

Alleghany Ore and Iron Company; general offices, Clifton Forge, Virginia; branch offices, West Street Building, 140 Cedar st., New York, and Arcade Building, Philadelphia. *Officers at New York:* C. H. Zehnder, President, and A. C. McFarland, Secretary. *Officer at Philadelphia:* Charles L. Huston, Vice President. *Officers at Clifton Forge:* J. L. Blizzard, Treasurer; R. S. Lackey, Assistant Secretary; W. P. Pierson, Comptroller; and W. W. Taylor, General Superintendent.

Sales Agents: Rogers, Brown & Co., Philadelphia, New York, Boston, Cincinnati, Cleveland, Buffalo, Chicago, and Pittsburgh.

Capital stock, \$2,100,000, of which \$875,000 is preferred and \$1,225,000 is common. The company owns and operates the following plants. A controlling interest in the company is owned by the Lukens Iron and Steel Company. (See pages 138-40.)

BLAST FURNACES—3.

Alleghany Furnace, Iron Gate, Virginia. One stack, 65 x 13½, built in 1891-2 and blown in December 1, 1892; rebuilt in 1900; one Foote and three Taws & Hartman improved Whitwell stoves; fuel, New River coke; ore, Oriskany brown hematite from Craig Creek; product, high-grade foundry and basic pig iron; annual capacity, 30,000 tons. Brand, "Alleghany."—*Active in 1907.*

Buena Vista Furnace, Buena Vista, Virginia. One stack, 70 x 16, built in 1889-90 and blown in December 12, 1890; rebuilt in 1903; one Foote and three Whitwell stoves; fuel, Pocahontas coke; ore, Oriskany; product, foundry and chill-cast basic pig iron; specialty, chill-cast pig iron for car wheels; annual capacity, 54,000 tons. Brand, "Buena Vista."—*Active in 1907.*

Gem Furnace, Shenandoah, Virginia. One stack, 70 x 16, built in 1882 and first blown in February 8, 1883; remodeled in 1889 and again in 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite mined on the furnace property; product, foundry, forge, and basic pig iron; annual capacity, 36,000 tons. Brand, "Gem."—*Active in 1907.*

Total annual capacity of the 3 furnaces: 120,000 gross tons.

IRON-ORE MINES AND LIMESTONE QUARRIES.

The company owns and operates the Oriskany iron-ore mine at Oriskany and Lignite, Virginia, and the Reid mine at Oriskany. It also leases on a royalty basis the Dixie ore mine at Vesuvius, Virginia. The annual capacity of these mines is about 172,000 gross tons.

The company operates under lease on a royalty basis a limestone quarry at Bells Valley, Rockbridge county, Virginia, owned by S. M. Davidson, with an annual capacity of about 25,000 tons.

VICTORIA COAL AND COKE COMPANY.

Victoria Coal and Coke Company; general offices, Clifton Forge, Virginia; branch offices, West Street Building, 140 Cedar st., New York. *Officer at New York:* C. H. Zehnder, President. *Officers at Clifton Forge:* W. W. Taylor, Vice President; J. L. Blizard, Treasurer; and W. P. Pierson, Auditor.

This company is controlled jointly by the Empire Steel and Iron Company and the Alleghany Ore and Iron Company. It owns and operates about 1,500 acres of coal lands at Caperton, West Virginia, with an annual capacity of 120,000 tons.

It also owns and operates 135 coke ovens at Caperton, in Fayette county, West Virginia, with an annual capacity of 35,000 net tons.

TENNESSEE COAL, IRON, AND RAILROAD COMPANY.

Tennessee Coal, Iron, and Railroad Company; general offices, Birmingham, Ala.; New York offices, Realty Building, 115 Broadway. *Officers at Birmingham:* ————, President; F. H. Crockard, Vice President and General Manager; W. A. Green, Secretary and Treasurer; T. M. Nesbitt, Auditor; Frank A. Burr, General Manager of Sales; and W. A. Major, Purchasing Agent. *Officer at New York:* John A. Topping, Chairman Board of Directors.

Selling Agencies: Realty Building, 115 Broadway, New York; First National Bank Building, Chicago; First National Bank Building, Cincinnati; Missouri Trust Building, St. Louis; Frick Building Annex, Pittsburgh; Citizens Building, Cleveland; and Endicott Building, St. Paul.

Kinds of Pig Iron: Foundry, forge, mill, basic, ferromanganese, and spiegeleisen. *Brands:* For steel and steel rails, "Ensley basic open hearth;" for pig iron, "Ensley," "Bessemer," "DeBardeleben," "Oxmoor," "Eureka," "Alice," and "South Pittsburg."

Brands for Coal and Coke: For coal: "Pratt," "Blocton," "Cahaba," "Blue Creek," "Gamble," "Henry-Ellen," and "Whitwell." For coke: "Pratt," "Blue Creek," "Bessemer," "Whitwell," and "By-product."

Capital stock authorized, \$50,000,000, of which \$25,866,435 of common and \$248,300 of preferred had been issued to March 1, 1907. Transfer Agents: Hanover National Bank, of New York. The Tennessee Coal, Iron, and Railroad Company operates the blast furnaces, rolling mills, steel works, etc., described below:

BLAST FURNACES—16.

Alice Furnace, Birmingham, Alabama. One stack, No. 2, 75 x 18, built in 1883 and put in blast July 24, 1883; rebuilt in 1902; six Whitwell stoves; fuel, Pratt coke made in the company's ovens; ores, red and brown from the company's mines; product, foundry, forge, and basic pig iron; annual capacity, 72,000 tons. Brand, "Alice." (Furnace No. 1, 75 x 15, built in 1879-80, dismantled in 1905.)—*Active in 1907.*

Bessemer Furnaces, Bessemer, Alabama. Five stacks: Nos. 1 and 2, each 75 x 16, built in 1886-7; No. 1 put in blast in 1888 and No. 2 in 1889; eight Whitwell stoves. Nos. 3 and 4, each 75 x 17, built in 1889-90 and No. 3 rebuilt in 1900; eight

Whitwell stoves. No. 5, or Little Belle, 60 x 12, built in 1889-90; three Whitwell stoves. Fuel, Pratt and Blue Creek coke made in the company's ovens; ores, red and brown from the company's mines; product, foundry and forge pig iron; total annual capacity, 288,000 tons. Brand, "DeBardeleben."—*Nos. 1, 2, 3, and 4 active in 1907; No. 5 not active to September 1, 1907, but to resume in that month.*

Ensley Furnaces, Ensley, Alabama. Six stacks: four, 80 x 20, built in 1887, 1888, and 1889; one, 85 x 20, built in 1903-5; and one, 86½ x 20½, built in 1905-6. No. 1 blown in March 19, 1889, and rebuilt in 1901; No. 2 blown in December 1, 1888, No. 3 blown in June 5, 1888, No. 4 blown in April 9, 1888, and rebuilt in 1907, No. 5 blown in August 17, 1906, and No. 6 blown in April 28, 1905. Nos. 1 and 2 have each four Gordon-Whitwell-Cowper stoves, Nos. 3, 4, and 5 have each four Massicks & Crooke stoves, and No. 6 has four Kennedy 2-pass stoves. Fuel, Pratt coke from the company's ovens and Semet-Solvay coke from ovens at Ensley; ores, red and brown from the company's mines; product, foundry, forge, and basic pig iron; total annual capacity, 576,000 tons. Brand, "Ensley." Two Uehling pig-iron casting machines. Nos. 3, 2, and 1 will be rebuilt in the order named; each stack will be 85 x 21½, will be equipped with four Massicks & Crooke stoves, and will have an annual capacity of 120,000 tons. (One stack, No. 5, built in 1899-1900, dismantled in 1905.)—*All active in 1907.*

Oxmoor Furnaces, Oxmoor, Alabama. Two alternate stacks: No. 1, 75 x 17, completed in July, 1877, and rebuilt and blown in in December, 1885; again rebuilt in 1902; No. 2, 75 x 17, first blown in in March, 1876; rebuilt and blown in in August, 1886; again rebuilt in 1899; seven Whitwell stoves; fuel, Pratt and Blue Creek coke made in the company's ovens; ores, red and brown from the company's mines; product, foundry and forge pig iron; total annual capacity, 120,000 tons. Brand, "Eureka."—*One active in 1907.*

South Pittsburg Furnaces, South Pittsburg, Tennessee. Two stacks: No. 2, 70 x 18, completed in 1881 and first blown in in March, 1882, and No. 3, 75 x 17, built in 1887-8 and first blown in in March, 1888; ten Whitwell stoves; fuel, coke made in the ovens of the company at Tracy City, Whitwell, and Victoria; ores, brown hematite from Georgia and hard red fossiliferous from the mines of the company; product, foundry and forge pig iron; total annual capacity, 110,000 tons. Brand, "South Pittsburg." (No. 1, 70 x 18, first blown in in May, 1879, partly dismantled in 1903.)—*Idle; No. 2 last active in July, 1904, and No. 3 in November, 1905.*

Total annual capacity of the 16 furnaces: 1,166,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1 OWNED AND 3 LEASED.

Bessemer Rolling Mills, Bessemer, Alabama. Built in 1887-8 and put in operation in September, 1888; 24 single puddling furnaces, 6 heating furnaces, one annealing furnace, 5 trains of rolls, (one 20-inch muck, one 8-inch guide, one 16-inch bar, one 22-inch sheet, and one 26-inch plate,) 9 Siemens gas producers, 2 plate straighteners, 3 rail straighteners, and one angle straightener; product, bar, guide, light and heavy plates up to 65 inches wide, and light rails; annual capacity, 60,000 tons. Fuel, coal and producer gas.

Birmingham Steel Works, Birmingham, Alabama. Two basic open-hearth steel furnaces (one 20 and one 25-gross-ton) built in 1897, 6 open-type gas producers, and two 40-ton cranes; first steel made July 22, 1897; product, rail ingots; annual capacity, 20,000 tons. Fuel, producer gas. (Owned by the Republic Iron and Steel Company; formerly operated by the Birmingham Rolling Mill Company; leased by the Tennessee Coal, Iron, and Railroad Company on May 1, 1906.)—*See pages 94-95.*

Steel Casting Department, Ensley, Alabama. Built in 1900; one 15-gross-ton basic open-hearth steel furnace; first steel made August 31, 1900; product, car couplers, gears, rolls, engine parts, and other steel castings; annual capacity, from 8,000 tons to 12,000 tons. Fuel, producer gas. An iron foundry is connected with the works. (Owned by the Alabama Steel and Shipbuilding Company and operated under lease by the Tennessee Coal, Iron, and Railroad Company.)

Steel Works Division, Ensley, Alabama. Built in 1898-9; first heat poured November 30, 1899; eleven 50-gross-ton basic open-hearth furnaces (10 tilting and one stationary) with an annual capacity of 350,000 tons of ingots; one coal reheating furnace, five 4-hole soaking pits, and one 44-inch blooming mill; product, blooms, billets, and slabs; also one 27-inch rail train with one 2-high 34-inch roughing mill; rail mill now being rebuilt and will probably be ready for operation in November, 1907; first steel rail rolled November 14, 1902; estimated annual capacity of rebuilt mill, 600,000 tons of rails. Fuel, producer gas. Connected with the works are one 250-gross-ton rolling acid-lined primary furnace and one 15-gross-ton acid-Bessemer converter for desiliconizing and decarburizing molten metal for the open-hearth steel furnaces, the metal being obtained from the Ensley Furnaces; primary furnace first put in operation February 14, 1904, and Bessemer converter February 17, 1904; lining of primary furnace may be changed from acid to basic. This department of the works is known as Ensley Plant No. 1. The company is now adding to these works four 60-gross-ton tilting basic open-hearth steel fur-

naces with an annual capacity of 300,000 tons of ingots and two 20-gross-ton removable acid-Bessemer converters; the Bessemer converters are to be used in desiliconizing and decarburizing molten metal for the open-hearth steel furnaces; the 4 building open-hearth furnaces will be ready for operation in November, 1907, and the 2 building Bessemer converters in September or October, 1907. Two additional 65-gross-ton basic open-hearth steel furnaces are to be built. This department is known as Ensley Plant No. 2. (Owned by the Alabama Steel and Shipbuilding Company and operated under lease by the Tennessee Coal, Iron, and Railroad Company.)

Total annual capacity of the 4 works, including additions now being made: 670,000 gross tons of open-hearth steel ingots, from 8,000 tons to 12,000 tons of steel castings, 600,000 tons of steel rails, and 60,000 tons of other finished rolled iron and steel products.

IRON FOUNDRY.

At Ensley the company operates a gray iron foundry, which makes castings principally for its own use; annual capacity, 4,200 tons.

COAL MINES, COKE OVENS, IRON-ORE MINES, ETC.

In addition to the above works the Tennessee Coal, Iron, and Railroad Company owns and operates the following properties:

Thirty-one coal mines, with a total annual capacity of 5,700,000 tons of coal, located at or near Pratt City, Ensley, Wylam, Stockton, Blossburg, Adger, Johns, Sumter, Blocton, Henry-Ellen, and Gamble in Alabama and Whitwell and Tracy City in Tennessee.

Sixteen coking plants, with 3,732 bee-hive coke ovens, having a total annual capacity of 1,800,000 tons of coke, located at Pratt City, Ensley, Wylam, Bessemer, Johns, Blocton, and Birmingham in Alabama and at Whitwell and Victoria in Tennessee.

Twenty-nine iron-ore mines, with a total annual capacity of 3,000,000 tons of red and brown hematite ores, located at or near Green Springs, Ishkooda, Smythe, Redding, Readers, Leogusta, Spring Gap, Martaban, Standiford, Giles, Bessemer, and Potter in Alabama and near Emerson in Georgia.

Extensive limestone and dolomite quarries at Ketona, Vanns, and Calcis in Alabama and at South Pittsburg in Tennessee, with a total annual capacity of 600,000 tons of stone.

The Tennessee Coal, Iron, and Railroad Company owns in Alabama, Tennessee, and Georgia 307,000 acres of coal lands, 39,000 acres of iron-ore lands, 69,000 acres of undeveloped mineral lands, and 30,933 acres of miscellaneous timber and other lands, making a grand total of 445,933 acres.

RAILROADS AND REPAIR SHOPS.

The Tennessee Coal, Iron, and Railroad Company controls the Birmingham Southern Railroad Company, of Birmingham, Alabama, which operates 106.4 miles of track, 39 locomotives, and 629 cars. It also operates car repair shops at Pratt City, Ala.

SOUTHERN STEEL COMPANY.

Southern Steel Company; general offices, Brown-Marx Building, Birmingham, Ala.; branch offices, Gadsden, Ala. *Officers at Birmingham:* Evan F. Jones, Vice President and General Manager; A. R. Forsyth, Treasurer; R. D. Carver, Secretary and Selling Agent; S. R. Chenoweth, Comptroller; and J. H. Clabaugh, Purchasing Agent. *Officer at Gadsden:* E. T. Schuler, Vice President. *Officers at New York:* C. P. Perin, Chairman of Board of Directors, and Moses Taylor, President, 30 Pine st.

Selling Agents for Pig Iron only: De Camp Brothers and Yule Iron, Coal, and Coke Company, St. Louis and Chicago; Nash, Isham & Co., New York; Walter-Wallingford & Co., Cincinnati; and Hickman, Williams & Co., Louisville and Cincinnati.

Capital stock, \$25,000,000, of which \$10,000,000 is 7 per cent. non-cumulative preferred and \$15,000,000 is common. The Southern Steel Company owns and operates the following plants:

BLAST FURNACES—4 COMPLETED AND 3 PROJECTED.

Chattanooga Furnace, Chattanooga, Tennessee. One stack, 75 x 15½; construction commenced in March, 1905, and completed in 1906; blown in April 25, 1906, by the Chattanooga Iron and Coal Company; four 4-pass Whitwell stoves, each 60 x 20; fuel, coke; ores, red and brown from Georgia and Alabama; product, foundry and forge pig iron; annual capacity, 68,000 tons. Brand, "Chattanooga." (Built by the Chattanooga Blast Furnace Company; acquired by the Southern Steel Company from the Chattanooga Iron and Coal Company on July 1, 1906.)—*Active in 1907.*

Gadsden Furnace No. 1, Gadsden, Alabama. One stack, 90 x 20, built in 1902-3 and first blown in January 17, 1904; remodeled in 1905-6; four 2-pass Foote stoves; fuel, coke; ore, red from Dekalb and Cherokee counties, Alabama; product, basic and occasionally foundry and forge pig iron; annual capacity, 110,000 tons. Brand, "Schuler." One Heyl & Patterson pig-iron casting machine is connected with the furnace. Three additional furnaces of the same size are projected. (Formerly operated by the Alabama

Steel and Wire Company; later by the Southern Steel Company.)—*Active in 1907.*

Rising Fawn Furnace, Rising Fawn, Georgia. One stack, 73 x 18½, built in 1873-5 and put in blast June 18, 1875; rebuilt in 1902-3; six 4-pass stoves (two 80 x 20 and four 60 x 18); fuel, coke; ore, brown hematite; product, high-silicon, high-manganese, foundry, and gray forge pig iron; annual capacity, 72,000 tons. Brand, "Rising Fawn." (Formerly operated by the Georgia Iron and Coal Company; acquired by the Southern Steel Company on October 1, 1906.)—*Active in 1907.*

Trussville Furnace, Trussville, Alabama. One stack, 80 x 17½, built in 1887-9 and blown in in April, 1889; rebuilt in 1901, 1903, and 1906; five Whitwell stoves; fuel, Alabama coke made in the company's ovens from coal mined on the furnace property; ores, red hematite from the company's mines in Alabama and brown from the company's mines in Georgia; product, basic, foundry, and forge pig iron; annual capacity, 70,000 tons. Brand, "Trussville." (Formerly called Ella Furnace and operated by the Lacey-Buek Iron Company; acquired by the Southern Steel Company on July 1, 1906.)—*Active in 1907.*

Total annual capacity of the 4 furnaces: 320,000 gross tons.

ROLLING MILLS AND STEEL WORKS—2.

Ensley Works, Ensley, Alabama. Built in 1899-1900 and first put in operation in March, 1900; 2 direct-fire heating furnaces, 2 annealing furnaces, 18 trains of rolls, (four 9, three 10, four 12, and seven 16-inch,) 173 wire-nail machines, and 219 wire-drawing blocks; product, small billets, wire rods, wire nails, plain, barbed, and galvanized wire, fence staples, and field fencing; annual capacity, 100,000 tons of rods, 130,000 tons of wire, and 1,000,000 kegs of wire nails. Fuel, coal. A galvanizing plant is connected with the works. (Formerly operated by the Alabama Steel and Wire Company; later by the Southern Steel Company.)

Gadsden Works, Gadsden, Alabama. Built in 1903-4 and first put in operation June 24, 1904; four 50-gross-ton basic open-hearth steel furnaces, three 4-hole soaking pits, and one 36-inch blooming mill; adding two 60-gross-ton basic open-hearth furnaces; product, ingots, blooms, and billets; annual capacity, 200,000 tons of ingots and 300,000 tons of blooms and billets. Fuel, coal. (Formerly operated by the Alabama Steel and Wire Company; later by the Southern Steel Company.)

Total annual capacity of the 2 works: 200,000 tons of open-hearth steel ingots, 300,000 tons of blooms and billets, 100,000 tons of wire rods, 130,000 tons of wire, and 1,000,000 kegs of wire nails.

WIRE-ROD, WIRE, AND WIRE-NAIL PLANTS.

Ensley Works, Ensley, Alabama. Product, wire rods, wire nails, plain, barbed, and galvanized wire, fence staples, and field fencing; annual capacity, 100,000 tons of wire rods, 130,000 tons of wire, and 1,000,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 219; sizes, from 0 to No. 18 gauge. Adding 42 Hoton continuous wire-drawing machines with a daily capacity of 400 tons, a number of which are now in operation. Wire-nail department: number of machines, 173; all sizes.

GALVANIZING WORKS AND FOUNDRIES.

Ensley Works, Ensley, Alabama. Number of galvanizing pans, 2; product, galvanized wire; annual capacity, 35,000 tons. The company produces for its own use gray iron and brass castings at Ensley and gray iron and open-hearth steel castings at Gadsden.

IRON-ORE MINES AND LIMESTONE QUARRIES.

The company owns 4,600 acres of iron-ore lands at Gaylesville, 800 acres at Porterville, and 2,000 acres at Crudup, Alabama. It also owns 120 acres at Cedartown, 1,800 acres at Oremont, 17,000 acres at Rogers, 2,800 acres at Shaw, 3,000 acres at Catoosa, and 9,000 acres at Rising Fawn, Georgia. Its iron-ore mines have an annual capacity of about 1,000,000 tons.

The Southern Steel Company also owns 200 acres of limestone lands in Etowah county, Alabama, and 106 acres at Ironco, Georgia. It also leases 80 acres at Spencer, Alabama.

COAL LANDS AND COKE OVENS.

The company also owns 4,200 acres of coal lands at Virginia, 4,000 acres at Altoona, 350 acres at Graves Mines, and 2,600 acres at Palos, Alabama. It also owns 21,300 acres at Cole City and 16,000 acres at Dunlap, Tennessee. Its coal mines have an annual capacity of about 1,000,000 tons.

The company also owns 300 bee-hive coke ovens at Virginia and 300 bee-hive ovens at Trussville, Alabama. It also owns 330 bee-hive ovens at Cole City and 114 bee-hive ovens at Dunlap, Tenn. Its coke ovens have an annual capacity of 560,000 net tons.

MACHINE SHOPS, LOCOMOTIVES, AXLE WORKS, ETC.

The company operates machine repair shops at its works at Ensley, Gadsden, Trussville, Chattanooga, and Rising Fawn. It also operates 15 locomotives at its various works.

The company also contemplates adding a steel-axle department to its Gadsden Works. This department will be equipped with 3 hammers and will have an annual capacity of about 15,000 tons.

SLOSS SHEFFIELD STEEL AND IRON COMPANY.

Sloss Sheffield Steel and Iron Company; principal offices, Jersey City, N. J.; operating offices, Birmingham, Alabama. *Officers at Birmingham:* J. C. Maben, President; J. W. McQueen, Vice President and General Sales Agent; E. L. Morris, Secretary and Treasurer; and E. J. Thomas, Jr., Auditor.

Selling Agents: J. W. McQueen, General Sales Agent, Birmingham; Hugh W. Adams & Son, 15 Beekman st., New York, and 185 Summer st., Boston; David Evans, Rookery Building, Chicago; J. K. Dimmick & Co., New Land Title Building, Philadelphia; Robert Field, First National Bank Building, Cincinnati; William Wieman, Lewis Block, Pittsburgh; E. C. Smith, 506 Commonwealth Trust Building, St. Louis; Zimmerman-Wells-Brown Company, Second and Ash sts., Portland, Oregon; Hardy Greenwood, post-office box 751, San Antonio, Texas; T. R. Hassam, 1 Calle de las Damas, 5, Mexico City, Mexico; and Wm. Jacks & Co., 41 St. Vincent Place, Glasgow, Scotland. *Registrar:* Guaranty Trust Company, New York. *Transfer Agents:* Central Trust Company, New York.

Capital stock, \$20,000,000, of which \$10,000,000 is 7 per cent. non-cumulative preferred and \$10,000,000 is common; \$6,700,000 of preferred and \$10,000,000 of common stock have been issued for the present requirements of the company and the balance will be reserved for future use. The bonded indebtedness, attached as a lien only on the property of the Sloss Iron and Steel Company, consists of \$2,000,000 of 6 per cent. and \$2,000,000 of 4½ per cent. bonds. The Sloss Sheffield Steel and Iron Company owns or operates the following blast furnaces, etc.:

BLAST FURNACES—7.

Hattie Ensley Furnace, Sheffield, Alabama. One stack, 75 x 17, built in 1887 and first put in blast December 31, 1887; remodeled in 1900 and rebuilt in 1903; five Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry and forge pig iron; annual capacity, 70,000 tons. Brand, "Sheffield."—*Active in 1907.*

Lady Ensley Furnace, Sheffield, Alabama. One stack, 75 x 17, built in 1887-9 and first blown in April 25, 1889; remodeled in 1900-1 and rebuilt in 1903 and 1906; five Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry and forge pig

iron; annual capacity, 70,000 tons. Brand, "Lady Ensley." (Formerly operated and partly owned by the North Alabama Furnace Company.)—*Active in 1907.*

Philadelphia Furnace, Florence, Alabama. One stack, 75 x 17, commenced by the W. B. Wood Furnace Company in 1887 and completed by the Florence Cotton and Iron Company in 1890-1; remodeled in 1900 and rebuilt in 1903; again rebuilt in 1906 and equipped with modern skip hoist and increased boiler power; five Whitwell stoves, each 70 x 20; fuel, coke; ore, brown hematite from the company's mines at Russellville, Alabama; product, foundry and forge pig iron; annual capacity, 70,000 tons. Brand, "Florence."—*Active in 1907.*

Sloss Furnaces, Birmingham, Alabama. Four stacks: No. 1, 82½ x 18, built in 1881-2, put in blast April 12, 1882, and rebuilt in 1895, 1901, and 1905; No. 2, 82½ x 18, built in 1882 and rebuilt in 1902 and 1906; No. 3, 73 x 17½, built in 1887-8, blown in in October, 1888, and rebuilt in 1901; No. 4, 82½ x 17½, built in 1887-9, blown in in February, 1889, and rebuilt in 1901 and 1907; equipped with twenty stoves, of which thirteen are Whitwell and seven are Gordon-Whitwell-Cowper; fuel, coke; ores, red fossiliferous, hard and soft, and brown hematite; ores and coal mined on the company's property within ten to fifteen miles of the furnaces; product, foundry and forge pig iron; total annual capacity, 225,000 tons. Brand, "Sloss."—*All active in 1907.*

Total annual capacity of the 7 furnaces: 435,000 gross tons.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

By the purchase in April, 1900, of the four blast furnaces of the Sloss Iron and Steel Company the Sloss Sheffield Steel and Iron Company acquired 951 coke ovens, of which 288 ovens were located at City Furnace, 214 ovens at Coalburg, 99 ovens at Brookside, and 350 ovens at Blossburg, Alabama. It also acquired 30,000 acres of iron-ore lands in Jefferson, St. Clair, Bibb, Tuscaloosa, Chilton, and Blount counties, Alabama. In addition it acquired 21,000 acres of coal lands in Jefferson, Blount, Etowah, and Shelby counties, Alabama. Also extensive limestone quarries at North Birmingham, Jefferson county, Alabama. Since April, 1900, the Sloss Sheffield Steel and Iron Company has built 287 additional coke ovens, of which 200 ovens are located at Flat Top, (Littleton,) and 87 ovens at New Found, (Brookside,) Alabama.

The Sloss Sheffield Steel and Iron Company now owns all the stock of the North Alabama Furnace Company, of Sheffield, Alabama, which formerly operated the Lady Ensley Furnace at Sheffield.

It also owns all the property of the Lady Ensley Coal, Iron, and Railroad Company, consisting of 14,000 acres of coal lands in Marion, Fayette, Walker, and Jefferson counties; 13,000 acres of brown iron-ore lands in Franklin and Colbert counties; and 200 coke ovens at Dora, (Ivy mines,) Walker county.

It has also 25,000 acres of coal lands on the line of the Southern Railway, south of Jasper, Alabama. On this property the company is now operating two mines which at present are producing 500,000 tons of coal annually. It also owns developed brown iron-ore lands, with an annual capacity of 350,000 tons of iron ore, and a limestone quarry near Russellville, Alabama.

The Sloss Sheffield Steel and Iron Company is now mining 7,000 tons of coal per day. It also has a capacity of 375,000 net tons of coke and 700,000 gross tons of iron ore per year.

ALABAMA CONSOLIDATED COAL AND IRON COMPANY.

Alabama Consolidated Coal and Iron Company; general and operating offices, Birmingham, Alabama; branch offices, 74 Broadway, New York. *Officers at Birmingham:* Guy R. Johnson, Vice President and General Manager, and W. M. Gulick, Auditor and Assistant Treasurer. *Officers at New York:* Joseph H. Hoadley, President, and William R. Sheldon, Secretary and Treasurer.

Selling Agents: Matthew Addy & Co., St. Louis, Cincinnati, Pittsburgh, New York, and Philadelphia.

Capital stock, \$3,750,000, of which \$1,250,000 is 7 per cent. cumulative preferred and \$2,500,000 is common. The Alabama Consolidated Coal and Iron Company operates the following works:

BLAST FURNACES—4.

Clifton Furnaces, Ironaton, Alabama. Two stacks: No. 1, 70 x 17½, built to use charcoal in 1884 and blown in on that fuel on April 16, 1885; changed to coke in 1895; rebuilt in 1896-7; five Whitwell-Cowper stoves. No. 2, 75 x 16, built in 1889-90 to use charcoal and blown in on that fuel in 1891; changed to coke in 1900; rebuilt in 1902; four Whitwell-Cowper stoves. Fuel, Alabama coke; ore, local brown hematite; product, foundry and forge pig iron; total annual capacity, 100,000 tons. Brand, "Clifton."—*Both active in 1907.*

Etowah Furnaces, Gadsden, Alabama. Two stacks: No. 1, 78 x 18;

construction commenced in July, 1905; blown in June 7, 1907; four Whitwell stoves. No. 2, 86 x 19, built in 1902-3 and blown in August 22, 1903; four 4-pass Whitwell-Cowper stoves. Fuel, coke; ores, local red and brown hematite; product, foundry and forge pig iron; total annual capacity, 150,000 tons. Brand, "Etowah." (The No. 2 Furnace was formerly called Gadsden-Alabama Furnace No. 2. One stack, known as Gadsden-Alabama Furnace No. 1, built in 1887-8, dismantled in 1905.)—*Both active in 1907.* Total annual capacity of the 4 furnaces: 250,000 gross tons.

IRON-ORE LANDS, COAL LANDS, COKE OVENS, ETC.

The company owns the Gate City property near Birmingham, Alabama, comprising about 1,800 acres of land. This property contains large deposits of red fossiliferous iron ore, as well as deposits of limestone, dolomite, building stone, sand, etc. On this property the company recently opened new hard red iron-ore mines at Hammond, Alabama, five miles east of Birmingham. It has also acquired the Standard Coal Company's property in Tuscaloosa county, Alabama, which contains 32,211 acres of coal and timber lands. There are now 915 completed coke ovens on the property. The company also acquired with the Clifton Furnaces about 2,500 acres of mineral lands and 15,000 acres of other lands, part of which is well timbered. With the Gadsden-Alabama Furnaces it acquired about 730 acres of ore and other lands. The company has also acquired about 3,700 acres of land near Gadsden, Alabama, containing deposits of red iron ore; also a large acreage of brown iron-ore property for its furnaces at Ironaton and Gadsden.

In addition the company has also purchased tracts of coal lands at Brookwood, Alabama, in the vicinity of Birmingham. It owns valuable red iron-ore properties near Attalla and Gadsden, the latter within one mile of the Etowah Furnaces and the former within five miles. On both properties there are developed mines with a daily capacity of from 400 to 600 tons. In 1901 the company acquired the property of the Jefferson Coal and Railway Company at Lewisburg, near Birmingham, comprising over 3,000 acres, all underlaid with coal. On this property there are two coal openings and 350 coke ovens. Steam and domestic coal are mined and furnace and foundry coke are made. The coke ovens owned by the company have a total annual capacity of about 300,000 tons. The company also owns about 300 acres of limestone property between its Clifton and Etowah Furnaces, on which it operates a quarry. At Hematite, Georgia, the company has 1,700 acres of brown iron-ore lands, equipped with ore washers.

INLAND STEEL COMPANY.

Inland Steel Company; general offices, First National Bank Building, Chicago; branch offices, Chemical Building, St. Louis. *Officers*: Charles Hart, President; L. E. Block, G. H. Jones, and R. J. Beatty, Vice Presidents; P. D. Block, Vice President and Treasurer; and E. M. Adams, Secretary.

Sales Offices and Agents: O. P. Blake, Sales Manager, Chemical Building, St. Louis; Davis, Kelly & Co., 147 Third st., Louisville; B. C. Bradford, Pioneer Press Building, St. Paul; and the John S. Worthington Company, 1618 Stout st., Denver.

Capital stock, \$5,000,000, all common. The Inland Steel Company owns and operates the plants and properties described below:

BLAST FURNACES—1 COMPLETED AND 1 PROJECTED.

Inland Furnace, Indiana Harbor, Indiana. One stack, 85 x 19½, built in 1906-7; construction commenced in August, 1906, and first blown in August 30, 1907; four Kennedy fire-brick stoves; fuel, Connellsville coke; ore, Mesabi; product, basic pig iron; estimated annual capacity, 125,000 tons. Brand, "Inland." Molten metal is used in the open-hearth steel furnaces of the company at Indiana Harbor. A second furnace, to be 85 x 19½, is projected.—*Active in 1907.*

Annual capacity of the completed furnace, 125,000 gross tons; of the projected furnace, 125,000 tons: total, 250,000 gross tons.

ROLLING MILLS AND STEEL WORKS—2.

Chicago Heights Works, Chicago Heights, Illinois. Built at Chicago in 1873 and removed to Chicago Heights in 1893 by the Chicago Steel Works; first put in operation at Chicago Heights in January, 1894; 6 heating furnaces, one 8 and one 14-inch train of rolls, and 6 hammers; product, bars, angles, tees, channels, agricultural shapes, harrow teeth, plow beams, cultivator attachments, and cross-arm braces; annual capacity, 30,000 tons of bar steel, 100,000 steel plow beams, and 1,500 tons of harrow teeth. Fuel, coal and coke. Brand, the word "Inland" in a diamond.

Indiana Harbor Works, Indiana Harbor, Indiana. Built in 1901-2; first steel made July 21, 1902; first products rolled November 1, 1902; six 50-gross-ton basic open-hearth steel furnaces, 16 heating furnaces, one 32-inch blooming mill, one 24-inch bar mill, 8 hot finishing mills, (one 32, two 36, one 38, two 40, one 44, and one 56-inch,) and 4 cold mills (three 40 and one 52-inch); prod-

uct, ingots, billets, slabs, sheets, steel roofing, light plates, angles, I beams, channels, shafting, universal plates, and merchant bars; annual capacity, 200,000 tons of ingots, 100,000 tons of universal plates, 35,000 tons of sheets, and 100,000 tons of bars. Fuel, oil, coal, and manufactured gas. One 12-inch Morgan bar mill is now being installed and will probably be ready for operation in the fall of 1907. Two additional 50-gross-ton basic open-hearth steel furnaces and one metal mixer are to be added in 1907. Molten metal from the blast furnace is used in the open-hearth steel furnaces.

Total annual capacity of the 2 rolling mills and steel works: 200,000 gross tons of ingots, 100,000 tons of universal plates, 35,000 tons of sheets, 100,000 tons of merchant bars, 30,000 tons of bar steel, 1,500 tons of harrow teeth, and 100,000 steel plow beams.

GALVANIZING PLANT, COAL MINES, AND IRON-ORE LANDS.

Indiana Harbor Works, Indiana Harbor. Two pots; product, galvanized sheets and roofing plates; annual capacity, 20,000 tons. The Inland Steel Company controls the Inland Coal and Washing Company, which owns 200 acres of coal lands at De Soto, Jackson county, Illinois, with an annual capacity of 180,000 tons.

It also owns the lease of and operates 40 acres of iron-ore lands in the Mesabi Range in Minnesota, on which is located the Laura (Hibbing) mine, with an annual capacity of about 250,000 tons.

INTERSTATE IRON AND STEEL COMPANY.

Interstate Iron and Steel Company; general offices, First National Bank Building, Chicago. *Officers at Chicago:* Silas J. Llewellyn, President and General Manager, and George F. Davie, Vice President and Treasurer. *Officer at Cambridge, Ohio:* George R. Stewart, Secretary and Local Manager. *Officer at East Chicago, Indiana:* Charles Johns, Manager.

Selling Agents: P. J. Kalman, St. Paul, Minn.; W. S. Weyer, Kansas City, Mo.; and W. H. D. Totten, Jr., Cincinnati.

Capital stock, \$400,000, all common. The Interstate Iron and Steel Company operates the following rolling mills:

ROLLING MILLS—2.

Cambridge Works, Cambridge, Ohio. Built in 1901 and first put in operation in that year; one Lauth heating furnace and 7 stands of 14-inch rolls; product, Bessemer steel angles, flats, rounds, U

bars, channel flats, light rails, concrete bars, etc.; annual capacity, 30,000 tons. Fuel, bituminous coal and natural gas. (Formerly owned and operated by the Cambridge Rolling Mill Company; also operated under lease by the Blondell Steel Company; acquired by the Interstate Iron and Steel Company in December, 1906.) East Chicago Works, East Chicago, Indiana. Built in 1900 and first put in operation in July, 1900; 7 double and 6 single puddling furnaces, one piling furnace, 6 heating furnaces, and 5 trains of rolls (one 18-inch muck, one 8 and one 9-inch Belgian and guide, one 12-inch guide and bar, and one 16-inch bar); product, iron and steel bars and shapes; annual capacity, 100,000 tons. Fuel, coal. (Formerly called the Emlyn Iron Works; acquired by the Interstate Iron and Steel Company on March 28, 1905.) Total annual capacity of the 2 rolling mills: 40,000 gross tons of muck bars and 130,000 gross tons of iron and steel bars, shapes, light rails, concrete bars, and other finished rolled products.

INTERNATIONAL HARVESTER COMPANY.

International Harvester Company; general offices, 7 Monroe st., Chicago. *Officers:* Cyrus H. McCormick, President; Charles Deering, Chairman of the Board of Directors; George W. Perkins, Chairman of the Finance Committee; James Deering, Harold F. McCormick, J. J. Glessner, and W. H. Jones, Vice Presidents; R. F. Howe, Secretary; Harold F. McCormick, Treasurer; and C. S. Funk, General Manager.

Capital stock, \$120,000,000, of which \$60,000,000 is preferred and \$60,000,000 is common. Date of annual meeting, third Thursday in April. The company owns and operates the following works:

ROLLING MILLS—1.

Osborne Works Rolling Mill, Auburn, N. Y. Built in 1881; 5 heating furnaces, 4 trains of rolls, (one 8, two 10, and one 12-inch finishing,) and one hammer; uses scrap iron and steel billets; product, merchant bars of all sizes and shapes, all used by the company in the manufacture of harvesting machinery and tillage implements; annual capacity, 20,000 tons of rolled products and 3,500 tons of forged products. Fuel, bituminous coal. Contemplates erecting two 15-gross-ton basic open-hearth steel furnaces. (Formerly owned and operated by D. M. Osborne & Co.)

Annual capacity of the rolling mills: 20,000 gross tons of rolled products and 3,500 tons of forged products.

MALLEABLE IRON FOUNDRIES.

Champion Works, Springfield, Ohio. Number of annealing furnaces, 38; daily capacity, 45 net tons.

Deering Works, 16 Fullerton ave., Chicago. Works at Fullerton and Clybourn aves. Number of annealing furnaces, 23; daily capacity, 55 net tons.

McCormick Works, Blue Island and Western aves., Chicago. Number of annealing furnaces, 24; daily capacity, 95 net tons.

Osborne Works, Auburn, N. Y. Number of annealing furnaces, 16; daily capacity, 25 net tons.

Product of the 4 works: malleable agricultural castings, all consumed by the company in the manufacture of harvesting machinery; total daily capacity: 220 net tons of malleable castings.

IRON AND BRASS FOUNDRIES AND TWINE MILLS.

The International Harvester Company also operates the following works, which either produce or use gray iron and brass castings in the manufacture of harvesting and agricultural machinery, tillage implements, and wagons: Akron Works, Akron, Ohio; Champion Works, Springfield, Ohio; Deering Works, Chicago; Keystone Works, Sterling, Ill.; McCormick Works, Chicago; Milwaukee Works, Milwaukee; Newark Valley Works, Newark Valley, N. Y.; Osborne Works, Auburn, N. Y.; Plano Works, West Pullman, Ill.; Waterloo Works, Waterloo, Iowa; and Weber Works, Chicago. The Champion, Deering, Keystone, McCormick, and Osborne Works manufacture harvesting machinery and tillage implements; the Milwaukee Works, gas engines, gas producers, and cream separators; the Newark Valley and Waterloo Works, manure spreaders; the Plano Works, manure spreaders and wagons; and the Weber Works, wagons. The Akron Works are being equipped to manufacture autobuggies and tractors.

The International Harvester Company also operates twine mills at its Akron, Deering, McCormick, and Osborne Works.

WISCONSIN STEEL COMPANY.

The Wisconsin Steel Company is a subsidiary company of the International Harvester Company and owns or leases and operates the following blast furnaces, rolling mills, steel works, etc:

BLAST FURNACES—2 COMPLETED AND 1 BUILDING.

South Chicago Furnaces, South Chicago, Ill. Two completed stacks and one stack building.

Completed stacks: Furnace A, (formerly known as No. 1,) 78 x 16,

built in 1880 and blown in in 1881; rebuilt in 1899, 1902, and 1906; four 2-pass stoves, each 75 x 18. Furnace No. 1, (formerly known as No. 2,) 80 x 19, built in 1902-3 and blown in August 7, 1903; four Kennedy stoves, each 80 x 22. Fuel, Connellsville and Virginia coke; ores, Mesabi, Lake Superior, and Wisconsin; product, Bessemer, malleable Bessemer, and foundry pig iron; total annual capacity, 200,000 tons. Hot metal is conveyed from these furnaces to the Bessemer steel converters at South Chicago. (Formerly operated by the South Chicago Furnace Company; later by the International Harvester Company.)—*Both active in 1907.*

Building stack: to be known as No. 2, 90 x 21; construction commenced December 18, 1906; being equipped with four 2-pass stoves, each 90 x 22; fuel, coke; ore, Lake Superior from the company's mines; product, Bessemer and foundry pig iron; estimated annual capacity, 140,000 tons.—*Will probably be ready for blast in January, 1908.*

Total annual capacity of the 2 completed furnaces, 200,000 gross tons; of the building furnace, 140,000 tons: total, 340,000 tons.

ROLLING MILLS AND STEEL WORKS—2.

Steel Mill, South Chicago. Built in 1902-3 and first put in operation March 31, 1903; two 10-gross-ton Bessemer converters with an annual capacity of 500,000 tons of ingots; first steel made September 3, 1903; molten metal from the South Chicago Furnaces is used in the Bessemer converters; two 250-ton mixers and 2 cupolas. One 35-inch reversing blooming mill, served by 6 gas-fired soaking pits, with an annual capacity of 250,000 tons of billets, blooms, and slabs. One Morgan bar mill with 8 stands of 14-inch continuous roughing and 4 stands of 11-inch and 2 stands of 8-inch finishing rolls; billets are heated in 2 Morgan continuous heating furnaces; annual capacity, 90,000 tons of bars and shapes. One Morgan bar mill with 6 stands of 16-inch roughing and 2 stands of 16-inch and 3 stands of 14-inch finishing rolls; 2 Morgan continuous heating furnaces are connected with this mill; annual capacity, 100,000 tons of finished bars and shapes. Fuel, bituminous coal. (Formerly called the South Chicago Works and operated by the International Harvester Company.)

Deering Works Rolling Mill, 16 Fullerton ave., Chicago. Built in 1901 and first put in operation October 10, 1901; 3 heating furnaces and one train of 13-inch rolls with 5 stands; product, merchant flats, rounds, angles, channels, and ovals rolled from old steel rails and billets; annual capacity, 20,000 tons. Brand, "Deering." Fuel, bituminous coal. (Formerly called the Deering Mills and operated by the International Harvester Company.)

Total annual capacity of the 2 rolling mills and steel works: 500,000 gross tons of Bessemer steel ingots, 250,000 gross tons of slabs, blooms, and billets, and 210,000 gross tons of bars and shapes.

IRON-ORE AND COAL LANDS.

The company also owns or controls about 720 acres of iron-ore lands in Minnesota, Wisconsin, and Michigan, including the Agnew and Hawkins mines in the Mesabi Range in Minnesota; the Victoria and Lot 3 mines at Crystal Falls, Michigan; and the output of the Illinois Iron Mining Company at North Freedom, Wisconsin, in the Baraboo Range. The capacity of these mines is about 750,000 tons of iron ore annually.

The Wisconsin Steel company also owns about 23,000 acres of undeveloped coal lands in Harlan county, Kentucky.

OTHER SUBSIDIARY COMPANIES.

The International Harvester Company controls the Wisconsin Lumber Company, which owns and operates a band saw mill at Deering, Mo., which has a daily capacity of 40,000 feet of sawed lumber. The Wisconsin Lumber Company also owns about 58,000 acres of timber lands in Pemiscot and Dunklin counties, Mo.

The International Harvester Company also controls the International Harvester Company of Canada, Limited, which owns and operates a plant at Hamilton, Ontario, Canada. The plant is equipped for the manufacture of malleable, gray iron, and brass castings, all of which are consumed by the company in the manufacture of harvesting machinery and tillage implements. The malleable foundry has a daily capacity of about 25 net tons.

The International Harvester Company also controls the A-B International Harvester Company, which owns and operates a plant at Norrköping, Sweden, which it acquired in 1905 from the Aktiebolaget Mekaniska Werkstaden Vulcan Company. Its annual capacity is 15,000 mowers, 10,000 rakes, and 5,000 reaping attachments.

The International Harvester Company also controls the International Flax Twine Company, which owns and operates a plant at St. Paul, Minnesota, for the manufacture of flax twine.

PIONEER IRON COMPANY.

Pioneer Iron Company; general offices, Negaunee, Mich.; Cleveland offices, Rockefeller Building. *Officers at Cleveland:* George

A. Garrettson, President; William G. Mather, Vice President; E. V. Hale, Secretary; and Fred A. Morse, Treasurer.

Selling Agencies: Superior Charcoal Iron Company, Grand Rapids, Michigan, for pig iron; W. S. Gray & Co., 76 William st., New York, for acetate of lime; and Perth Amboy Chemical Works, 100 William st., New York, for formaldehyde.

Capital stock, \$125,000, all common. The Pioneer Iron Company owns and operates the blast furnaces, charcoal plants, wood alcohol plants, and acetate of lime plants described below:

BLAST FURNACES—2.

Carp Furnace, Marquette, Michigan. One stack, 58½ x 10, built in 1872-3, burned in 1882, and rebuilt in 1889-90; idle for several years; revived and rebuilt in 1899 and blown in October 16, 1899; two iron stoves; warm blast; fuel, charcoal; ore, Lake Superior; product, car-wheel, foundry, malleable, and low-phosphorus pig iron; annual capacity, 18,000 tons. Brand, "Excelsior." Charcoal kilns are connected with the furnace.—*Active in 1907.*

Pioneer Furnace No. 2, Marquette, Michigan. One stack, 70 x 12, built in 1901-3 and first put in operation April 16, 1903; three hot-blast stoves; fuel, charcoal; ore, Lake Superior; product, car-wheel, foundry, malleable, and low-phosphorus pig iron; annual capacity, 42,000 tons. Brand, "Marquette." Charcoal kilns are connected with the furnace.—*Active in 1907.*

Total annual capacity of the 2 furnaces: 60,000 gross tons of car-wheel, foundry, malleable, and low-phosphorus pig iron.

CHARCOAL, WOOD ALCOHOL, ACETATE OF LIME, ETC.

At Marquette the company operates plants for the manufacture of charcoal, wood alcohol, acetate of lime, and formaldehyde. The charcoal plant is equipped with thirty 90-cord, eighty 80-cord, nine 42-cord, and ten 25-cord kilns, with a total annual capacity of 6,000,000 bushels. The wood alcohol plant has an annual capacity of 300,000 gallons, the acetate of lime plant has an annual capacity of 3,500,000 pounds, and the formaldehyde plant has an annual capacity of 750,000 pounds of formaldehyde.

THE CLEVELAND-CLIFFS IRON COMPANY.

The Cleveland-Cliffs Iron Company; general offices, Ishpeming, Michigan; Cleveland offices, Rockefeller Building. *Officers at Cleveland:* William G. Mather, President and Treasurer; J. H.

Sheadle, Secretary; and R. C. Mann, Auditor. *Officer at New York*: J. H. Wade, Vice President.

Selling Agencies: Superior Charcoal Iron Company, Grand Rapids, Michigan, for pig iron, and W. S. Gray & Co., 76 William st., New York, for acetate of lime.

Capital stock authorized, \$5,000,000, all common; capital stock issued, \$4,910,000. The company owns and operates the blast furnace and other plants and properties described below:

BLAST FURNACES—1.

Pioneer Furnace, Gladstone, Michigan. One stack, 60 x 12, built in 1895-6 and blown in April 16, 1896; two hot-blast stoves; fuel, charcoal; ores, Lake Superior and specular and soft hematites from the company's mines; product, car-wheel, malleable, foundry, and low-phosphorus pig iron; annual capacity, 45,000 tons. Brand, "Pioneer." Also operates charcoal kilns and retorts.—*Active in 1907.*

Annual capacity: 45,000 gross tons of charcoal pig iron.

CHARCOAL, WOOD ALCOHOL, AND ACETATE OF LIME PLANTS.

At Gladstone the company operates plants for the manufacture of charcoal, wood alcohol, and acetate of lime. The charcoal plant is equipped with twenty 80-cord and fifty 60-cord charcoal kilns and 10 charcoal retorts, with a total annual capacity of 3,455,000 bushels. The wood alcohol plant has an annual capacity of 350,000 gallons of wood alcohol and the acetate of lime plant has an annual capacity of about 4,000,000 pounds of acetate of lime.

IRON-ORE LANDS.

The company owns the Lake, Moro, Salisbury, Cliffs Shaft, Ogden, and East New York iron-ore mines at Ishpeming, Michigan, the Lucy and Jackson mines at Negaunee, Michigan, and the Princeton mine at Princeton, Michigan. These mines have an annual capacity of 1,540,000 tons of ore. The East New York and Lucy mines are idle. The company also leases the Ashland iron-ore mine at Ironwood, Michigan, the Maas mine at Negaunee, Michigan, the Crosby mine at Nashwauk, Minnesota, the Stephenson and Austin mines at Princeton, Michigan, and the Iron Belt mine at Iron Belt, Wisconsin. These mines have an annual capacity of 800,000 tons of ore. The Maas mine is being developed and the Iron Belt mine is being explored. The company also partly owns or controls the Negaunee mine at Negaunee, Michigan, and the Webster and Imperial mines at Michigamme, Michigan. These mines have an annual capacity of 400,000 tons of ore.

LAKE SUPERIOR IRON AND CHEMICAL COMPANY.

Lake Superior Iron and Chemical Company; general offices, Detroit. *Officers:* Elisha H. Flinn, President; William G. Sharp, First Vice President; E. G. Rust, Second Vice President; John Christian, Secretary; William G. Smith, Treasurer; and C. F. Fraser, Assistant Treasurer.

Selling Agencies: Superior Charcoal Iron Company, Grand Rapids, Mich., for pig iron made by the Manistique, Chocolay, Elk Rapids, Newberry, and Boyne City plants; and Rogers, Brown & Co., Cincinnati and branch houses, for pig iron made by the Ashland Plant.

Capital stock authorized, \$7,500,000, all common. Bonds authorized, \$6,000,000. The Lake Superior Iron and Chemical Company operates the blast furnaces and other plants described below:

BLAST FURNACES—6.

Ashland Plant, Ashland, Wis. One stack, 60 x 12, built in 1887-8 and blown in in March, 1888; remodeled in 1897; closed top; two Whitwell stoves; hot blast; fuel, charcoal; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 45,000 tons. Brand, "Hinkle." Charcoal kilns are connected with the furnace; also a plant for the manufacture of wood alcohol and acetate of lime; also a machine shop. Selling agents, Rogers, Brown & Co., Cincinnati and branch houses. (Formerly called the Hinkle Furnace and operated by the Ashland Iron and Steel Company; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Active in 1907.*

Boyne City Plant, Boyne City, Mich. One stack, 60 x 10½, built in 1903-4, utilizing machinery from the abandoned Martel Furnace at St. Ignace, Mich., and blown in January 1, 1905; two Kloman fire-brick stoves, each 60 x 15½; fuel, charcoal; ore, Lake Superior from the Marquette and Menominee districts; product, car-wheel and malleable pig iron; annual capacity, 29,000 tons. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly called Pine Lake Furnace and operated by the Boyne City Charcoal Iron Company; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Active in 1907.*

Chocolay Plant, Chocolay, Mich. One stack, 58 x 10, built in 1860 and rebuilt in 1890; long inactive; rebuilt and revived in 1907

by the Northern Charcoal Iron Company; two iron pipe stoves (one 24 and one 32-inch); fuel, charcoal; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 25,000 tons. Charcoal kilns are connected with the furnace. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly called the Chocoley Furnace and owned but never operated by the Northern Charcoal Iron Company; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Being rebuilt; to be ready for blast in September or October, 1907.*

Elk Rapids Plant, Elk Rapids, Mich. One stack, 64 x 11, first put in blast in July, 1873; rebuilt in 1902; hot blast; fuel, charcoal; ore, Lake Superior exclusively; specialties, Nos. 3 and 4 pig iron for car wheels and malleable castings; annual capacity, 35,000 tons. Brand, "Elk Rapids." Charcoal kilns are connected with the furnace; also a plant for the manufacture of wood alcohol and acetate of lime; also a machine shop. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly called the Elk Rapids Furnace and operated by the Elk Rapids Iron Company; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Active in 1907.*

Manistique Plant, Manistique, Mich. One stack, 58 x 12, built in 1890-1 and blown in March 4, 1891; three iron stoves; warm blast; blast heated to 800 or 850 degrees; fuel, charcoal; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 36,000 tons. Brand, "Champion." Charcoal kilns are connected with the furnace; also a plant for the manufacture of wood alcohol and acetate of lime. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly operated by the Manistique Iron Company; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Active in 1907.*

Newberry Plant, Newberry, Mich. One stack, 51½ x 10½, built in 1882-3 and blown in in May, 1883; rebuilt in 1892 and 1903; closed top; four iron stoves; warm blast; water jackets; fuel, charcoal; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 29,000 tons. Brand, "Michigan." Charcoal kilns are connected with the furnace; also a plant for the manufacture of wood alcohol and acetate of lime. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly operated by the Michigan Iron Company, Limited; acquired by the Lake Superior Iron and Chemical Company on May 1, 1907.)—*Active in 1907.*

Total annual capacity of the 6 furnaces: 199,000 gross tons of foundry, car-wheel, and malleable charcoal pig iron.

CHARCOAL, WOOD ALCOHOL, AND ACETATE OF LIME PLANTS.

In addition to the blast furnaces enumerated the Lake Superior Iron and Chemical Company acquired from the Manistique Iron Company, at Manistique, 84 charcoal kilns with a capacity of 65 cords each; also 30 charcoal kilns with a capacity of 65 cords each from the Northern Charcoal Iron Company, at Chocoley; 61 charcoal kilns and a plant for the manufacture of wood alcohol and acetate of lime from the Elk Rapids Iron Company, at Elk Rapids; 84 charcoal kilns and a plant for the manufacture of wood alcohol and acetate of lime from the Ashland Iron and Steel Company, at Ashland; and 58 charcoal kilns with a capacity of 90 cords each from the Michigan Iron Company, Limited, at Newberry.

In addition the Lake Superior Iron and Chemical Company acquired from the Burrell Chemical Company, of Manistique, Mich., and the Superior Chemical Company, of Newberry, Mich., works for the manufacture of wood alcohol and acetate of lime. Plants for the manufacture of these products will probably be installed shortly at the blast furnaces of the company which are not now equipped with plants for the recovery of charcoal by-products.

IRON-ORE AND TIMBER LANDS.

The Lake Superior Iron and Chemical Company through the purchase of the properties above described also acquired considerably over two hundred thousand acres of timber lands in Michigan and Wisconsin, together with a number of railroads and extensive iron-ore mines in the Lake Superior region.

NATIONAL ENAMELING AND STAMPING COMPANY.

National Enameling and Stamping Company; executive offices, 81-83 Fulton st., New York; salesrooms and warehouses: 374-78 Broadway, New York; cor. Canal and Fulton sts., Chicago; Cass ave., St. Louis; St. Paul ave., Milwaukee; Ohio ave. and Light st., Baltimore; and 627-29 Magazine st., New Orleans. *Officers:* F. G. Niedringhaus, President, and T. K. Niedringhaus, Second Vice President, St. Louis; Ferdinand A. W. Kieckhefer, First Vice President, Milwaukee; A. M. Steinhardt, Treasurer, New York; and William H. Matthai, Secretary, and George W. Knapp, Director General of Works, Baltimore.

Capital stock, \$30,000,000, of which \$10,000,000 is 7 per cent. cumulative preferred and \$20,000,000 is common. Of the total capitalization \$1,603,400 of the preferred and \$4,558,200 of the common stock remain in the treasury. The National Enameling and Stamping Company operates the rolling mills, steel works, tinplate and terne plate works, and stamping and enameling works enumerated below. It declines to give detailed descriptions of its rolling mills and steel works for the Directory.

ROLLING MILLS AND STEEL WORKS—2.

Granite City Steel Works Branch, Granite City, Illinois. Built in 1895 and enlarged in 1899-1900; product, basic open-hearth steel ingots, billets, tinplate and sheet bars, and black plates or sheets for stamping, enameling, or tin and terne plates, all consumed by the company. Fuel, bituminous coal and producer gas. (Formerly called the Granite City Rolling Mills.)

Granite Iron Rolling Mills Branch, Second and Destrehan sts., St. Louis. Built in 1879 and enlarged in 1900; product, stamping sheet iron for "granite iron ware," galvanizing sheets, and black plates for tin and terne plates. Fuel, coal. Brand, "Juniata" for galvanized sheets and "Granite Mills Soft Steel" for merchant grades. (Formerly called the St. Louis Rolling Mills.)

FOUNDRY AND TINPLATE AND TERNE PLATE WORKS.

Granite City Foundry, Granite City, Illinois. Product, gray iron castings for the company's use; annual capacity, 1,500 tons.

Granite City Tinplate Branch, Granite City, Illinois. Tinning plant added to rolling mill at St. Louis in 1890; first tinplates made in November, 1890, and first terne plates in March, 1891; machinery removed to Granite City in 1906; first tinplates made at Granite City in October, 1906; terne plates not made to September 1, 1907; 14 sets; weekly capacity, 4,800 boxes of tinplates and terne plates of 108 pounds. Fuel, coal.

Total weekly capacity of tinplate and terne plate plant: 4,800 boxes; annual capacity of the gray iron foundry, 1,500 tons.

STAMPING AND ENAMELING WORKS.

Baltimore Branches, Baltimore, Maryland. Two plants: Matthai, Ingram & Co. Branch, Ohio ave. and Light st.; product, enamelled, japanned, pieced, and stamped ware, etc. Keen and Hagerty Branch, Race and Ostend sts.; product, galvanized, tinned, and japanned stamped ware.

Berlin Branch, Berlin, Long Island, N. Y. Product, enameled ware, galvanized iron ware, etc.

Brooklyn Branch, 103-19 North Third st., Brooklyn, N. Y. Product, plain, japanned, and stamped tinware and galvanized ware. Granite City Branch, Granite City, Illinois. Product, enameled, tinned, and stamped ware, etc.

Milwaukee Branch, St. Paul ave., Milwaukee, Wisconsin. Product, enameled, tinned, japanned, brass, copper, and galvanized ware.

New Orleans Branch, 627-29 Magazine st., New Orleans, Louisiana. Product, plain, retinned, and pieced tinware and japanned and galvanized ware. Also sells enameled ware of affiliated branches.

HELMBACHER FORGE AND ROLLING MILLS COMPANY.

Helmbacher Forge and Rolling Mills Company; general offices, Lincoln Trust Building, St. Louis. *Officers*: W. J. McBride, President; S. C. Leonard, First Vice President and General Manager; D. A. Bixby, Secretary; S. S. DeLano, Treasurer; N. A. Doyle, Auditor; and W. E. Hedgcock, Purchasing Agent.

Capital stock, \$1,000,000, all common. The Helmbacher Forge and Rolling Mills Company operates the following works:

ROLLING MILLS—2.

Helmbacher Plant, South Second st., between Lami and Barton sts., St. Louis. Built in 1858; 2 single and 3 double puddling furnaces, 11 heating furnaces, 3 trains of rolls, (one 10, one 18, and one 19-inch,) and 4 hammers (one helve axle, one link, one 1-ton, and one 3-ton); product, bar, rod, and band iron, coupling links and pins, shafts, and all kinds of railroad, steamboat, and machinery forgings; annual capacity, 60,000 tons of rolled and 1,000 tons of forged products. Fuel, coal.

Madison Plant, Madison, Illinois. Built in 1900-1 by the Hager Steel and Iron Company and first put in operation in February, 1901; destroyed by fire in April, 1902; rebuilt by the Helmbacher Forge and Rolling Mills Company and put in operation October 15, 1902; 5 cinder bottom scrap and 4 sand bottom scrap furnaces, 4 Leonard-McKenzie heating furnaces, and 3 trains of rolls (one 18-inch muck, one 9-inch guide, and one 16-inch bar); product, merchant bar and guide iron; annual capacity, 60,000 tons. Fuel, bituminous coal.

Total annual capacity of the 2 rolling mills: 120,000 gross tons of rolled and 1,000 tons of forged products.

FORGING WORKS.

Helmbacher Plant, St. Louis. Number of hammers, 4; product, coupling links and pins, shafts, and all kinds of railroad, steamboat, and machinery forgings; annual capacity, 1,000 tons.

AMERICAN CAR AND FOUNDRY COMPANY.

American Car and Foundry Company; general offices, Lincoln Trust Building, St. Louis; Eastern offices, Broad Exchange Building, New York. *Officers at St. Louis:* E. F. Carry, First Vice President and General Manager; J. M. Buick, Fourth Vice President; D. A. Bixby, Secretary; S. S. DeLano, Treasurer; Nicholas A. Doyle, Auditor; and W. E. Hedgcock, Purchasing Agent. *Officer at Chicago:* E. F. Carry, First Vice President and General Manager, Railway Exchange Building. *Officers at New York:* Frederick H. Eaton, President, and William C. Dickerman, Third Vice President. *District Managers:* Berwick, Pa., W. F. Lowry; Chicago, Frank Thompson; Huntington, W. Va., John W. Ensign; Jeffersonville, Indiana, J. D. Ingram; St. Charles, Missouri, J. G. Lawler; Detroit, Joseph G. Johnston; Madison, Illinois, and St. Louis, Joseph D. Granville, Lincoln Trust Building, St. Louis; Wilmington, Delaware, Charles S. Gawthrop; Memphis, Tennessee, Charles A. Price. *Resident Representatives:* Buffalo and Depew, N. Y., W. H. Sanford, Buffalo; Milton, Pa., B. B. Cannon; Terre Haute and Indianapolis, Indiana, I. G. Reading, Terre Haute. *Registrar:* Central Trust Company, New York. *Transfer Agent:* Guaranty Trust Company, New York.

Capital stock, \$60,000,000, of which \$30,000,000 is 7 per cent. non-cumulative preferred and \$30,000,000 is common. The American Car and Foundry Company operates the following works:

ROLLING MILLS—3.

Jackson and Woodin Works, Berwick, Pa. Built in 1872; 10 double puddling furnaces, 7 heating furnaces, and 4 trains of rolls (one 9, one 12, and two 18-inch); product, merchant bar iron; annual capacity, 50,000 tons. Fuel, bituminous coal. Brand, "Berwick." Also build cars and manufacture car wheels, forgings, gray iron castings, and cast-iron gas and water pipe.

Michigan-Peninsular Works, Detroit. Forge originally built in 1870 and rolling mill in 1877; destroyed by fire in November, 1892, and immediately rebuilt; 10 heating furnaces, 7 busheling furnaces, 5 hammers, and 3 trains of rolls (12, 16, and 20-inch);

product, bar iron, car axles, links and pins, and miscellaneous forgings; annual capacity, 60,000 tons of bar iron. Fuel, coal. A foundry for the manufacture of cast-iron gas and water pipe, two foundries for manufacturing car and other iron castings, two foundries for making car wheels, and two large carbuilding shops are connected with the works.

Milton Rolling Mill and Forge, Milton, Pa. Put in operation December 1, 1872; acquired by the present owners May 1, 1905; 5 single and 3 double puddling furnaces, one gas and 4 coal heating furnaces, one rotary squeezer, 5 trains of rolls, (8, 10, 15, 18, and 20-inch,) 2 hammers, and machinery for the production of iron and steel slabs; product, merchant bar iron and hammered slabs; annual capacity, 20,000 tons of bar iron and 3,500 tons of hammered slabs. Fuel, bituminous coal. Brand, "Milton." (Formerly operated by the Milton Iron Company.)

Total annual capacity of the 3 rolling mills: 130,000 gross tons of merchant bar iron and 3,500 gross tons of hammered slabs.

IRON AND STEEL ROLLED AND HAMMERED CAR-AXLE WORKS.

Ensign Works, Huntington, W. Va. Product, hammered car axles from wrought scrap iron; annual capacity, 20,000 axles.—*Not operated.*

Jackson and Woodin Works, Berwick, Pa. Product, straight-rolled iron and steel car axles; annual capacity, 10,000 axles.

Michigan-Peninsular Works, Detroit. Product, hammered iron and steel car axles; annual capacity, 45,000 axles.—*Not operated.*

Total annual capacity of the active and idle works: 75,000 rolled and hammered iron and steel car axles.

CAR-WHEEL WORKS AND BRASS AND IRON FOUNDRIES.

Ensign Works, Huntington, W. Va. Product, patent contracting cast-iron chilled car wheels; annual capacity, 90,000 wheels. Also solid and patent self-oiling mine and logging wheels; annual capacity, 12,000 wheels. Also make railroad and other gray iron castings; annual capacity, 10,000 tons.

Indianapolis Works, West Indianapolis, Indiana. Product, railroad and other gray iron castings; annual capacity, 6,000 tons.

Jackson and Woodin Works, Berwick, Pa. Product, freight and mine car wheels; annual capacity, 150,000 chilled freight and 55,000 mine car wheels. Also make railroad and other gray iron castings; annual capacity, 12,000 tons.

Madison Car Works, Madison, Illinois. Product, chilled cast-iron wheels for passenger, freight, engine, logging, mine, motor, and other cars; annual capacity, 400,000 wheels.

Memphis Works, Memphis, Tenn. Works at Binghampton, Ten-

nessee. Product, railroad and other gray iron castings; annual capacity, 5,000 tons. (Formerly operated by the Southern Car and Foundry Company.)

Michigan-Peninsular Works, Detroit. Two car-wheel plants. Product, chilled cast-iron car wheels; total annual capacity, 240,000 wheels. Also operate two gray iron casting plants; product, railroad and other castings; annual capacity, 30,000 tons.

Milton Car Works, Milton, Pa. Product, railroad and other gray iron castings; annual capacity, 4,000 tons.

Missouri Car and Foundry Works, St. Louis. Product, chilled cast-iron wheels for locomotive, passenger, freight, motor, mine, ore, logging, truck, and cable cars; annual capacity, 150,000 wheels. Also make railroad and other gray iron castings; annual capacity, 17,500 tons.

Niagara Car Wheel Works, Buffalo. Product, chilled cast-iron wheels for steam, electric, and street cars; annual capacity, 100,000 wheels.

St. Charles Works, St. Charles, Missouri. Product, chilled cast-iron car wheels; annual capacity, 86,000 wheels. Also make railroad and other gray iron, malleable iron, and brass castings for cars; annual capacity, 5,000 tons of iron and 75 tons of brass castings.

Terre Haute Works, Terre Haute, Indiana. Product, Barr contracting chilled cast-iron freight and street car wheels; annual capacity, 75,000 wheels. Also make railroad and other gray iron castings; annual capacity, 7,500 tons.

Wells and French Works, Paulina and Blue Island avenues, Chicago. Product, all kinds of chilled cast-iron car wheels; annual capacity, 130,000 wheels. Also make railroad and other gray iron castings; annual capacity, 10,000 tons.

Total annual capacity of the 10 car-wheel works: 1,488,000 wheels; of the 11 gray iron and malleable foundries, 107,000 gross tons of castings; and of the single brass foundry, 75 tons of castings.

MALLEABLE IRON WORKS.

St. Charles Works, St. Charles, Missouri. Ten annealing furnaces; product, malleable castings for cars; daily capacity, 10 tons.

CAST-IRON PIPE WORKS.

Jackson and Woodin Works, Berwick, Pa. Product, cast-iron gas and water pipe; sizes of pipe, from 3 to 16 inches; daily melting capacity, 50 tons.

Michigan-Peninsular Works, Detroit. Product, cast-iron gas and water pipe; sizes of pipe, from 4 to 42 inches; daily melting capacity, 50 tons.

Total daily melting capacity of the 2 works: 100 gross tons.

COMPLETED AND PROJECTED CARBUILDING WORKS.

- Bloomsburg Plant, Bloomsburg, Pa. Product, wooden and steel underframe freight cars; annual capacity, 3,000 cars.
- Buffalo Car Works, Buffalo, N. Y. Product, wooden freight cars; annual capacity, 5,000 cars.
- Ensign Works, Huntington, W. Va. Product, wooden, steel underframe, and all-steel freight cars; annual capacity, 9,000 cars.
- Gary Plant, Gary, Ind. The erection of a steel carbuilding plant at Gary is contemplated.
- Indianapolis Works, West Indianapolis, Indiana. Now used for repairing freight cars only.
- Jackson and Sharp Works, Wilmington, Delaware. Product, wooden and steel underframe sleeping, parlor, express, mail, baggage, electric, street, and cable cars; sectional work for export a specialty; annual capacity, 300 passenger and 150 street cars. Also build and repair wooden vessels, car floats, lighters, etc., and operate a marine railway; also manufacture and erect all kinds of architectural wood work, making a specialty of fine residences and office buildings.
- Jackson and Woodin Works, Berwick, Pa. Product, wooden, steel underframe, and all-steel freight and steel passenger cars; annual capacity, 15,000 freight and 600 passenger cars.
- Madison Car Works, Madison, Ill. Product, wooden, steel underframe, and all-steel freight cars; annual capacity, 15,000 cars.
- Manchester Works, Trafford Park, Manchester, England. Product, wooden, steel underframe, and all-steel freight and steel passenger cars; annual capacity, 1,200 freight and 300 passenger cars.
- Memphis Works, Memphis, Tennessee. Works at Binghampton, Tenn. Product, wooden freight cars; annual capacity, 5,000 cars.
- Michigan-Peninsular Works, Detroit. Two works. Product, wooden, steel underframe, and all-steel freight cars; annual capacity, 30,000 cars.
- Milton Car Works, Milton, Pa. Product, wooden and steel underframe freight cars; annual capacity, 4,500 cars. These works make a specialty of tank cars with both wood and steel underframes and have an annual capacity of about 4,000 tank cars.
- Missouri Car and Foundry Works, St. Louis. Product, wooden, steel underframe, and all-steel freight cars; annual capacity, 15,000 cars. A new steel car plant was added to these works in 1907 and put in operation in June of that year.
- Ohio Falls Works, Jeffersonville, Indiana. Product, wooden, steel underframe, and all-steel freight cars and wooden and steel passenger cars; annual capacity, 6,000 freight and 300 passenger cars.

St. Charles Works, St. Charles, Missouri. Product, wooden freight cars and wooden and steel underframe passenger cars; annual capacity, 7,000 freight and 300 passenger cars.

Terre Haute Works, Terre Haute, Indiana. Product, wooden and steel underframe freight cars; annual capacity, 9,000 cars.

Union Works, Depew, N. Y. Product, wooden freight cars; annual capacity, 10,000 cars. Operated at the present time for freight car repair work only.

Wells and French Works, Chicago. Product, wooden and steel underframe freight cars; annual capacity, 12,000 cars.

Total annual capacity of the 17 carbuilding works: 1,950 passenger and street cars and 150,700 freight cars; of the former 600 are all-steel cars and of the latter 90,000 are all-steel or steel underframe cars. The product of the above works includes all classes of passenger and street cars and freight cars of every description, including box, coal, horse, beer, ice, refrigerator, ore, dump, construction, hay, furniture, tank, sand, stock, logging, mine, plantation, cane, and caboose cars for foreign and domestic use.

IRON AND STEEL BOLT, NUT, AND FORGING WORKS.

Buffalo Car Works, Buffalo, N. Y. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 1,000 tons.

Ensign Works, Huntington, W. Va. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 1,500 tons.

Indianapolis Works, West Indianapolis, Indiana. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not intended for the use of the company, 1,000 tons.

Jackson and Sharp Works, Wilmington, Delaware. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 300 tons.

Jackson and Woodin Works, Berwick, Pa. Product, bolts, nuts, and light railroad forgings; sizes: bolts from $\frac{3}{8}$ of an inch to 2 inches; square nuts from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches; and hexagon nuts from $\frac{3}{8}$ to $\frac{1}{2}$ of an inch; annual capacity of forgings not for the use of the company, 6,000 tons.

Madison Car Works, Madison, Illinois. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 2,000 tons.

Memphis Works, Memphis, Tenn. Works at Binghampton, Tenn. Product, bolts and rivets and light railroad forgings; sizes: bolts from $\frac{1}{2}$ of an inch to 2 inches and rivets from $\frac{1}{2}$ of an inch to

1 inch; annual capacity of forgings not for the use of the company, 3,000 tons.

Michigan-Peninsular Works, Detroit. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 4,000 tons.

Milton Car Works, Milton, Pa. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 500 tons.

Missouri Car and Foundry Works, St. Louis. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 1,000 tons.

Ohio Falls Works, Jeffersonville, Indiana. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 2,500 tons.

St. Charles Works, St. Charles, Missouri. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 2,500 tons.

Terre Haute Works, Terre Haute, Indiana. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 1,000 tons.

Union Works, Depew, N. Y. Product, bolts from $\frac{1}{2}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 3,000 tons.

Wells and French Works, Chicago. Product, bolts from $\frac{3}{8}$ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 2,000 tons.

Total annual capacity of forgings for sale: 31,300 gross tons.

THE COLORADO FUEL AND IRON COMPANY.

The Colorado Fuel and Iron Company; general offices, Boston Building, Denver, Colorado. *Officers at Denver:* J. F. Welborn, President; E. L. Wiles, Assistant to President; D. C. Beaman, Vice President, Secretary, and General Counsel; Albert A. Miller, Treasurer; A. D. Moss, Assistant Treasurer; J. A. Writer, Auditor; and S. G. Pierson, Purchasing Agent. *Officer at New York:* H. L. Utter, Assistant Secretary, 195 Broadway. *Officers at Pueblo, Colorado:* J. B. McKennan, Manager, and J. H. Means, Assistant Manager.

Sales Offices: Boston Building, Denver; Mills Building, El Paso, Texas; Fort Worth National Bank Building, Fort Worth, Texas; Pacific Electric Building, Los Angeles, Cal.; Bacon Block, Oak-

land, Cal.; Deseret News Building, Salt Lake City, Utah; 312 Chamber of Commerce Building, Portland, Oregon; Butte, Montana; and Hutchinson, Kansas.

Capital stock authorized, \$46,200,000, of which \$2,000,000 is 8 per cent. cumulative preferred and \$44,200,000 is common. The Colorado Fuel and Iron Company owns and operates the blast furnaces, rolling mills, steel works, etc., described below:

BLAST FURNACES—6.

Minnequa Furnaces, Pueblo. Six stacks: Furnace A, 80 x 21, built in 1900-1 and blown in September 4, 1901; four stoves, each 106 x 21. Furnace B, 75 x 17, built in 1890-1 and blown in November 25, 1892; remodeled and capacity increased in 1901; three stoves, each 70 x 18, and one stove, 93 x 21. Furnace C, 75 x 16½, built in 1880-1, blown in September 10, 1881, and rebuilt and modernized in 1893; five stoves, each 60 x 15½. Furnace D, 95 x 20, built in 1901-2 and blown in November 20, 1902; four stoves, each 106 x 21. Furnace E, 90 x 20, built in 1901-2 and blown in May 30, 1903; four stoves, each 100 x 21. Furnace F, 85 x 20; construction commenced in November, 1902; blown in May 2, 1907; four stoves, each 102 x 21. Fuel, coke, made at the company's ovens; ores, limonite, hematite, and magnetite from the company's mines in Colorado, Wyoming, and New Mexico, and manganese ores from Colorado and Utah; product, Bessemer, basic, and foundry pig iron and spiegeleisen and ferromanganese; total annual capacity, 625,000 tons. Molten metal from these furnaces is used in the Bessemer converters and the open-hearth furnaces at the Minnequa Steel Works. Equipped with 2 pig-iron casting machines, (one Uehling and one Heyl & Patterson.)—*All active in 1907.*

Total annual capacity: 625,000 gross tons of Bessemer, basic, and foundry pig iron and spiegeleisen and ferromanganese.

COMPLETED ROLLING MILLS AND STEEL WORKS.

Minnequa Rolling Mills and Steel Works, Pueblo. Built in 1881-2 and improved in 1889, 1891, 1893, and 1901-6. Bessemer and open-hearth steel works, rail mills, merchant mills, wire-rod mills, wire-drawing plant, wire-nail works, etc.

Bessemer Steel Works; original works built in 1881-2; first blow made April 11, 1882; dismantled in December, 1902; new works built in 1901-2; two 15-gross-ton converters, two 250-ton molten metal storage tanks, 3 pig iron and 3 spiegel melting cupolas, and one manganese heating furnace; first blow made in new works December 22, 1902; product, ingots; annual capacity, 600,000

tons. Fuel, coal, coke, and oil. Molten metal from the blast furnaces and from the iron cupolas is delivered to the storage tanks and thence conveyed to the converters.

Open Hearth Steel Works; built in 1902-3; twelve 50-gross-ton basic furnaces and one 250-ton molten metal storage tank; first basic open-hearth steel made June 29, 1903; product, ingots; annual capacity, 400,000 tons. Fuel, producer gas. Molten metal from the blast furnaces is delivered to the storage tank and thence conveyed to the open-hearth furnaces. A plant for calcining dolomite is connected with these works.

Rail Mill; built in 1881-2; improved and enlarged in 1896, 1902, and 1906; six vertical 4-hole 6-ingot heating furnaces, 2 bloom reheating furnaces, and 3 trains of rolls (one 36-inch reversing blooming, one 3-high 28-inch roughing, and one 3-high 26-inch finishing); first steel rail rolled April 17, 1882; product, Bessemer and open-hearth steel rails, splice bars, and billets; annual capacity, 360,000 tons. Improvements now being made, the date of completion of which is uncertain, will increase the annual capacity of rolled products to 480,000 tons.

Merchant Mills; 5 heating furnaces and 3 trains of rolls (one 9, one 12, and one 20-inch); product, iron and steel merchant bars, steel mine rails, splice bars, and structural and other shapes; annual capacity, 60,000 tons.

Blooming and Billet Mill; built in 1902-3; five vertical 4-hole 6-ingot heating furnaces and one 40-inch reversing blooming and billet mill; first steel billets rolled June 29, 1903; product, steel blooms and billets; annual capacity, 350,000 tons.

Rod Mills; built in 1902-3; 4 continuous heating furnaces, one continuous roughing mill, and 2 Garrett rod mills; mill No. 1 first rolled rods on July 5, 1903; mill No. 2 equipped in 1905 with hot bed, tables, shears, etc., to produce merchant bars; first bars rolled December 19, 1905; annual capacity, 120,000 tons of wire rods and 120,000 tons of merchant bars.

Fuel used in all rolling mill departments, coal and producer gas.

Total annual capacity of the rolling mills and steel works: 600,000 tons of Bessemer steel ingots, 400,000 tons of open-hearth steel ingots, 480,000 tons of Bessemer and open-hearth steel rails, 350,000 tons of blooms and billets, 120,000 tons of wire rods, and 180,000 tons of merchant bars, mine rails, splice bars, etc.

BUILDING ROLLING MILLS.

Merchant Mills; construction commenced in 1902; not yet finished; to be equipped with 5 continuous heating furnaces and one 24-inch reversing, one 14-inch continuous with 4 stands, one 12-inch

with 3 stands, one 14-inch continuous with 2 stands, and two 9-inch trains of rolls; product, structural shapes, sheet and tinplate bars, billets, splice bars, merchant bars, and hoops and cotton-ties; estimated annual capacity, 300,000 tons. The 12-inch train and one of the 14-inch trains were put in operation on August 16, 1907.

Sheet and Tinplate Mills; construction commenced in 1902; not yet completed; work suspended; to be equipped with the necessary heating furnaces and with 13 sheet and black plate mills, (eight 26-inch hot and five 22-inch cold,) and 16 tin and terne plate mills (ten 26-inch hot and six 22-inch cold); product, sheets and black plates for tinning; estimated annual capacity, 30,000 tons of sheets and 30,000 tons of black plates.

Total annual capacity of building rolling mills: 300,000 gross tons of structural shapes, sheet and tinplate bars, billets, splice bars, merchant bars, and hoops and cotton-ties, 30,000 tons of sheets, and 30,000 tons of black plates, or sheets, for tinning.

WIRE, WIRE NAILS, SPIKES, AND BOLTS AND NUTS.

Wire and Wire Nail Departments; built in 1902-3; first wire drawn July 14, 1903; first wire nails made July 24, 1903; 358 wire-drawing blocks, 280 wire-nail machines, 6 staple machines, and 96 barbed-wire machines; product, bright, annealed, and galvanized wire, wire nails, staples, barbed wire, bale-ties, etc.; annual capacity, 200,000 tons of wire, bale-ties, barbed wire, etc., and 2,500,000 kegs of wire nails and staples.

Spike Factory; enlarged in 1903 and 1906; 6 automatic and 6 hand-fed machines; product, railroad and boat spikes; annual capacity, 40,000 tons.

Bolt and Nut Factory; product, track bolts, pipe bands, machine and other bolts, nuts, rivets, etc.; annual capacity, 10,000 tons.

CAST-IRON PIPE WORKS, FOUNDRIES, ETC.

Cast Iron Pipe Foundry; built in 1890 and first pipe made in December, 1890; product, cast-iron gas and water pipe and specials from 3 to 20 inches in diameter; annual capacity, 18,000 gross tons.

The company also operates iron, brass, and steel foundries which manufacture castings for its own use only.

Connected with the Minnequa Works are machine, boiler, blacksmith, roll-turning, pipe fitting, electric repair, carpenter, and pattern shops; also a pattern storage house and supply storehouses; also electric light and power stations and an ample gravity water supply with reserve pumping stations at the works.

IRON-ORE AND COAL LANDS, COKE OVENS, ETC.

The Colorado Fuel and Iron Company owns and controls the Sunrise and Chicago iron-ore mines in Laramie county, Wyoming, and the Orient iron-ore mine in Saguache county, Colorado. These mines have an annual capacity of 1,000,000 tons of ore. In addition it leases the Fierro iron-ore mine in Grant county, New Mexico, which has an annual capacity of 200,000 tons. The company also owns and leases iron-ore properties in Colorado, Wyoming, Utah, New Mexico, and California. Total annual capacity of the active mines owned, controlled, or leased, 1,200,000 gross tons.

The Colorado Fuel and Iron Company owns and controls approximately 300,000 acres of coal lands at Sopris, Engle, Berwind, Rouse, Walsen, Robinson, Pictou, Primero, Starkville, Coal Creek, Fremont, Rockvale, Brookside, Canon, Crested Butte, Anthracite, Floresta, Gulch, Sunlight, Placita, Coalbasin, Tabasco, Hezron, Tercio, Cuatro, Quinto, Morley, and other points in Colorado, and at Los Cerrillos in New Mexico. The annual capacity of these mines is about 6,000,000 tons.

It also owns and operates 2,972 coke ovens at Sopris, El Moro, Starkville, Crested Butte, Cardiff, Redstone, Tabasco, Segundo, and Tercio, all in Colorado, and at Waldo in New Mexico, with an annual capacity of 1,500,000 tons. It also operates large limestone and dolomite quarries at Lime and Calcite in Colorado.

RAILROADS.

The Colorado Fuel and Iron Company owns and controls the Crystal River Railroad Company, which operates 21 miles of standard and 12 miles of narrow gauge track in Garfield and Pitkin counties, Colorado, connecting with the Denver and Rio Grande Railroad at Carbondale, Colorado.

It also owns and controls the Northern, Middle, and Southern divisions of the Colorado and Wyoming Railway. The Northern division of this company operates 17.89 miles of standard-gauge track in Laramie county, Wyoming, extending from Hartville Junction to Sunrise, and connecting with the Colorado and Southern Railway at Hartville Junction and with the Burlington route at Guernsey. The Middle division operates 94.64 miles of track in and around the Minnequa Steel Works, at Pueblo, and connects with all railroads entering Pueblo. The Southern division operates 58.2 miles of standard-gauge track in Las Animas county, Colorado, extending from Jansen to Cuatro, Colorado, and connecting with the Atchison, Topeka, and Santa Fé Railway at Jansen and with the Colorado and Southern Railway and the Denver and Rio Grande Railroad at Sopris.

THE IRON AND STEEL WORKS OF THE UNITED STATES.

PART II—BY STATES AND DISTRICTS.

IN Part II is embodied a description of all blast furnaces, rolling mills, steel works, and forges and bloomeries in the United States that are not described in Part I and are now active or may possibly be active at some future time. It also embraces a list of all iron and steel works that have been recently abandoned or dismantled or that have been inactive for several years. The telegraph address is given only when it is not the same as the post-office address. The dimensions for blast furnaces relate to their present size. When the power is not mentioned steam power is to be understood. Unless otherwise stated capacities are given in gross tons of 2,240 pounds and on double turn.

MAINE.

ROLLING MILLS—1.

Portland Iron and Steel Company, 1009 Board of Trade Building, Boston. Works at South Portland, Maine. Built in 1866; destroyed by fire on October 2, 1899, and rebuilt in 1900; again destroyed by fire in August, 1902, and rebuilt in 1903; one double and 7 single busheling furnaces, 4 heating furnaces, and 3 trains of rolls (one 3-high 18-inch muck, one 3-high 18-inch bar, and one 10 and one 16-inch tandem); product, merchant bar iron, bolt iron, and rolled iron shafting; annual capacity, 30,000 tons. Fuel, bituminous coal. Brands, "Refined" and "Best." Roland H. Boutwell, President; Roswell M. Boutwell, Vice President and Treasurer; Seth L. Martin, General Manager. (Formerly called the Portland Rolling Mill.)

Number of rolling mills in Maine: one. No blast furnaces in Maine.

MASSACHUSETTS.

CHARCOAL FURNACES—2.

Cheshire Furnace, Berkshire Iron Works, Samuel G. Colt, proprietor, Pittsfield. Furnace at Cheshire, Berkshire county. One stack, 32 x 8, built in 1850 and rebuilt in 1870; long idle; thoroughly

overhauled in 1906-7; operations resumed April 10, 1907; warm blast; fuel, charcoal; ores, red and brown hematite obtained from mines on the furnace property; annual capacity, 5,000 gross tons of foundry pig iron for car wheels, engine cylinders, chilled rolls, crushing plates, etc. Brand, "Berkshire." Two charcoal kilns with an annual capacity of 60,000 bushels are connected with the furnace. Langdon Mallory, Superintendent. (Formerly owned by the Richmond Iron Company; acquired by Mr. Colt on June 11, 1906.)—*Active in 1907.*

Richmond Furnace, Richmond Iron Works, Richmond Furnace P. O., Berkshire county. One stack, $33\frac{1}{2} \times 9\frac{1}{2}$, built in 1829 and rebuilt in 1863; thoroughly overhauled in 1905; warm blast; one 28-pipe iron stove; fuel, charcoal; ore, local brown hematite from mines owned by the company; annual capacity, 5,000 tons of foundry pig iron for car wheels and machinery. Brand, "Richmond." Charcoal pits and kilns with an annual capacity of about 175,000 bushels are connected with the furnace. R. A. Burget, President; William H. Hall, Treasurer. (Formerly operated by the Richmond Iron Company; name changed in April, 1905, to the Richmond Iron Works. Van Dusenille Furnace, $32 \times 9\frac{1}{2}$, built in 1834 and last active in 1896, dismantled in 1906.)—*Active in 1907.*

Number of furnaces in Massachusetts: 2 charcoal stacks. There are no mineral fuel blast furnaces in Massachusetts.

ROLLING MILLS AND STEEL WORKS—14 COMPLETED AND 1 PROJECTED.

Danvers Iron Works, The Sylvester Company, Mason Building, 70 Kilby st., Boston. Works at Danvers; freight station, Danversport. Built in 1831; burned and rebuilt in 1883; again burned in 1894 and rebuilt in 1895; 3 scrap heating furnaces, 2 trains of rolls, (one 10 and one 18-inch,) and 4 spike machines; product, merchant bar iron up to 2 inches and flats up to 4 inches wide, bolt iron, scrap rods, railroad and ship spikes, bolts, tie rods, and other miscellaneous forgings; annual capacity, 12,000 gross tons of finished products. Fuel, bituminous coal. Brand, "Danvers." B. F. Sylvester, President; John P. Sylvester, Treasurer. All sales made by the company.

Eastern Steel Casting Company, 696 East First st., South Boston. Built in 1905; two 8-pot Hunter crucible steel-melting furnaces; 8 pots can be used at a heat; total number of pots, 16; first crucible steel made on December 1, 1905; product, all kinds of crucible steel castings; annual capacity, 600 gross tons. Fuel, crude petroleum. Two additional crucible steel-melting fur-

naces may be built. John W. Johnson, General Manager and Proprietor.

Kinsley Iron and Machine Company, Canton. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process; stock company formed in 1854; works now contain 5 heating furnaces, 4 busheling and 2 scrap furnaces, 9 hammers, and 3 trains of rolls (one 8, one 14, and one 20-inch); steam and water power; product, merchant bar iron, hot machine-straightened shafting iron, loom crank iron, round iron, square iron, hexagon iron, flat iron, ice-run iron, track bolts, building rods, bolts, bolt ends, tire benders, hangers, wagon axles, forgings, and steam and street railroad supplies; annual capacity, single turn, 15,000 tons. Fuel, coal and oil. Brands of bar iron, "Kinsley Best" and "Best Refined." A forge for the manufacture of wagon axles, etc., is connected with the works; also a gray iron foundry and a machine shop. Oliver Ames, President; Oakes Ames, Treasurer; Joseph B. Hall, Assistant Treasurer and General Manager; William H. Bense, Sales Agent.—*Idle and for sale. Company will probably be dissolved.*

Loring Coes & Co., Incorporated, Department, Coes' Wrench Company, No. 1 Coes Square, Worcester; branch offices, 21 Warren st., New York. Works at Worcester. Built in 1846 and first put in operation in 1846-7; rebuilt in 1872, 1880, 1896, and 1903; enlarged in 1907; 2 billet reheating furnaces, 6 forge fires, 3 trains of hot rolls, (one 2-high 9-inch and two 2-high 10-inch,) and 4 hammers (one 600-lb. and three 200-lb.); product, welded materials for knife and die work, all consumed by the company in the manufacture of machine knives and die stock for cutting dies; annual capacity, from 600 to 700 tons of knife stock and 200 tons of die stock. Fuel, anthracite coal and oil. A machine shop is connected with the works. Steam and water power are used. Frank L. Coes, President, Treasurer, General Manager, and Purchasing Agent; F. Searle, Vice President and Superintendent.

Lundin Steel Casting Company, 6 Beacon st., Boston. Works on Clark ave., near Webster ave., Chelsea. Product, hard and soft crucible steel castings for automobiles, machinery, tools, dies, etc.; annual capacity, 120 tons. Fuel, gas and oil. A. G. Lundin, President; William A. Thibodeau, Treasurer. (Formerly operated by the Tool Steel Casting Company.)

Massachusetts Steel Casting Company, Everett. Works at West Everett. Two 15-gross-ton acid open-hearth steel furnaces built in 1900; first steel made December 20, 1900; annual capacity, 11,000 tons. Tropenas steel department added in 1904; first blow made December 29, 1904; now contains two 2-gross-ton Tropenas

converters and 2 cupolas; annual capacity, 2,500 tons. Product, steel castings from $\frac{1}{4}$ of a pound to 60,000 pounds. Fuel, manufactured gas and coal. A pattern shop is connected with the works. J. A. Dalzell, President; R. L. Dana, Treasurer. (Crucible and open-hearth steel furnaces formerly operated by the United States Steel Company; acquired by the Massachusetts Steel Casting Company on June 3, 1904. Six 4-pot crucible steel-melting furnaces dismantled in July, 1906; first crucible steel made in September, 1899.)

New England Steel Casting Company, Hyde Park; branch offices, 60 State st., Boston. Built in 1902-3; five crucible steel-melting furnaces; first steel made in January, 1903; product, castings up to 1,000 pounds; annual capacity, 350 tons. Fuel, petroleum. Eugene Edwards, President and Treasurer. (Formerly operated by the Pope-Robinson Steel Company; acquired by the New England Steel Casting Company on July 1, 1904.)

South Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Worcester, Mass.—*See page 46.*

Stanley (The) Works, Bridgewater. Principal offices, New Britain, Conn.; branch offices, 79 Chambers st., New York. Built in 1785 and rebuilt in 1874 and 1900; 2 trains of rolls, 7 heating furnaces, one air furnace, and 2 cupolas; steam and water power; product, Bessemer and open-hearth steel bands, hoops, and tack plate, all consumed by the works; also chilled and sand rolls and all kinds of heavy gray iron castings; annual capacity, 35,000 tons of rolled products, 6,000 tons of gray iron castings, and 2,000 tons of air-furnace castings. Fuel, coal. The works also contain 10 idle cut-nail machines. William H. Hart, President, George P. Hart, First Vice President, E. A. Moore, Second Vice President, and L. H. Pease, Secretary and Treasurer, New Britain, Conn.; C. R. Fitch, Manager, Bridgewater.

Thomson-Houston Electric Company, Steel Foundry Department, 42 Centre st., West Lynn. (Operating for the General Electric Company; general offices, Schenectady, New York.) W. C. Fish, Manager Lynn Works. Three 15-gross-ton acid open-hearth steel furnaces, 2 erected in 1892 and one in 1898; first acid steel made March 4, 1893; also made basic open-hearth steel castings in 1905 but their manufacture has been discontinued; product, acid steel castings; annual capacity, 12,000 tons. Fuel, manufactured gas. The company also operates a small crucible steel department for the manufacture of special castings. C. A. Coffin, President; J. R. Lovejoy, Vice President; M. F. Westover, Secretary; Henry W. Darling, Treasurer.

Tremont Nail Works, Tremont Nail Company, West Wareham;

railroad station, Tremont. Built about 1820 and greatly enlarged in 1846; one 3-gross-ton Clapp-Griffiths steel converter (now idle) added in 1887 and first steel made in December, 1887; one 20-gross-ton basic open-hearth furnace, with gas producers, added in 1893 and first open-hearth steel made June 8, 1893; one 30-gross-ton basic open-hearth furnace, with gas producers, added in 1907; 4 blooming furnaces, 2 heating furnaces, 2 annealing furnaces, one 30-inch blooming mill, one 18-inch nail plate and strip mill, and 150 cut-nail machines; steam and water power; annual capacity, 30,000 tons of basic open-hearth steel ingots, with mill facilities for finishing them, and 200,000 kegs of cut nails. Fuel, coal and manufactured gas. Brands, "Percha plates" and "Percha nails." Gerard C. Tobey, President; Horace P. Tobey, Treasurer. Sales made at the works at West Wareham and at the company's offices at 70 Kilby st., Boston.

United States Navy Yard, Charlestown. Mill built in 1868; 32 forge fires, 19 chain fires, 4 bar furnaces, 7 reheating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, bars for chain, cable, and anchor iron, etc., for the use of the Government; annual capacity, single turn, 1,800 tons. Fuel, coal, coke, and gas from naphtha. Also makes chains, forgings, anchors, chain appendages, etc.

Watertown Arsenal, Watertown. One 2-gross-ton Tropenas steel converter built in 1903-4 and one cupola; first steel made March 25, 1904; product, steel castings for gun carriages for the use of the Government; annual capacity, 1,200 tons. Fuel, coke.

Worcester Steel Foundry Company, Millbury, Worcester county. Built in 1902 and first crucible steel made in that year; 9 crucible steel-melting furnaces; number of pots, 54; product, small castings ranging from 5 to 600 pounds and electric rail bonds; annual capacity, 600 tons. Fuel, crude oil. William Pestell, President and General Manager; V. H. Moody, Treasurer.

PROJECTED STEEL-CASTING WORKS.

Security Construction and Engineering Company, 32 Linden st., Brookline. Contemplates erecting works at South Boston for the manufacture of basic open-hearth steel and gray iron castings; estimated annual capacity, 3,000 tons of open-hearth and 3,000 tons of gray iron castings. Fuel to be used, producer gas. A machine shop and a plant for the fabrication of structural steel will be connected with the works.—*Work on one open-hearth steel furnace will probably be commenced in the fall of 1907.*

Number of rolling mills and steel works in Massachusetts: 14 completed and one projected. Of these one can make Clapp-Grif-

fifths steel, 2 make Tropenas steel, 4 make open-hearth steel, one open-hearth steel plant is projected, and 5 make crucible steel.

RHODE ISLAND.

ROLLING MILLS AND STEEL WORKS—4.

Providence Steel Casting Company, 164 Allens avenue, Providence.

Two 2-gross-ton Tropenas steel converters with 2 cupolas built in 1903-4; first steel made in May, 1904; product, steel castings; annual capacity, 2,500 tons. Fuel, coke. Alfred S. Johnson, Trustee in Bankruptcy, 324 Butler Exchange, Providence.—*Idle; to be sold at public auction by the Trustee on October 2, 1907.*

Rhode Island Horse Shoe Works, Rhode Island Perkins Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Established in 1867; 7 scrap and 7 heating furnaces, 10 trains of rolls, (five 8, two 9, and three 18-inch,) and 28 horseshoe machines; product, bars for the horseshoe machines and toe-calks; annual capacity, single turn, 18,000 tons. Fuel, bituminous coal. Brands, "Perkins Horse and Mule Shoes" and "Perkins Patent Toe-Calks." Francis W. Carpenter, President; Richard W. Comstock, Vice President; Edward M. Wheeler, Secretary and Treasurer; John E. Alexander, General Manager; George L. Bowen, General Sales Agent.

Washburn Wire Company, Phillipsdale. New York offices, 26 Cortlandt st.; New York factory, East 118th st. and Harlem river. Two rolling mills in Rhode Island and a wire-drawing plant in New York City: Phillipsdale Plant, at Phillipsdale (owned); built in 1901 and first put in operation in May, 1901; 3 heating furnaces, 3 trains of rolls, (one 16, one 20, and one 24-inch,) and two 15-gross-ton Wellman tilting basic open-hearth steel furnaces with a total annual capacity of 25,000 tons of ingots; first steel made August 17, 1901; product, flat and round rods; annual capacity, 20,000 tons of rolled products; fuel, bituminous coal and oil. Auburn Plant, at Auburn; leased from the John Wales Wire Company; built in 1901 and first put in operation on November 25, 1901; one continuous heating furnace and 3 trains of rolls (one 9, one 10, and one 16-inch); also equipped with wire-drawing blocks and wire-nail machines; product, rods, wire, and wire nails; annual capacity, 20,000 tons of rods, 12,000 tons of wire, and 90,000 kegs of wire nails; fuel, bituminous coal; a galvanizing plant is connected with these works; (formerly operated by the John Wales Wire Company.) The Washburn Wire Company also owns and operates a wire-drawing plant at the foot of East 118th st., New York; annual capacity, 12,000

tons. Eugene R. Phillips, President ; E. A. Smith, Vice President ; Joseph Remick, Treasurer ; C. R. Remington, Jr., Secretary. —*Land and buildings at Auburn sold ; machinery to be removed to and re-erected at Phillipsdale, where it will probably be ready for operation in January, 1908.*

Number of rolling mills and steel works in Rhode Island: 4. Of these one makes Tropenas steel castings and one makes open-hearth steel ingots. There are no blast furnaces in Rhode Island.

CONNECTICUT.

CHARCOAL FURNACES—3.

Canaan Furnaces, Barnum Richardson Company, Lime Rock. Furnaces at East Canaan. Two stacks ; fuel, charcoal.—*See page 111.* Lime Rock Furnace, Barnum Richardson Company, Lime Rock. One stack ; fuel, charcoal.—*See pages 111-12.*

Number of charcoal furnaces in Connecticut: 3 stacks. There are no mineral fuel blast furnaces in Connecticut.

ROLLING MILLS AND STEEL WORKS—8.

Aetna (The) Nut Company, Southington. Built in 1872-3 ; one single puddling furnace, one scrap furnace, 3 busheling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 18-inch) ; product, cold and hot punching nut shapes, merchant iron, rounds and squares, half rounds, half ovals, ovals, machine-forged and hot-pressed nuts, washers, and wrought-iron cross-arm braces ; annual capacity, 10,000 tons. Fuel, coal. S. D. Neal, General Manager ; J. H. Pratt, President ; Benjamin S. Porter, Secretary and Treasurer. Sales made by the company.

American (The) Tube and Stamping Company, Bridgeport. Works located at the harbor entrance of the 22-foot United States Government channel ; company owns railroad connecting its works with the N. Y., N. H., and H. R. R. Hot-rolling mill department built in 1887 ; 10 heating furnaces and eight 8-inch to 26-inch hot sheet and other mills ; product, hoop, band, and plate and sheet steel ; annual capacity, 100,000 tons. Open-hearth department added in 1902-3 ; first steel made July 18, 1903 ; three 40-gross-ton basic furnaces with room for 7 additional furnaces, two 4-hole soaking pits, and one 34-inch blooming mill ; annual capacity, 80,000 tons of ingots and 250,000 tons of blooms, slabs, and billets. Fuel, desulphurized oil and manufactured gas. Brand, "Swedoh." The company holds in reserve ground for the erection of iron ore and coal docks, by-product coke ovens, blast furnaces, etc. Also operates a cold-rolling strip steel department with an

annual capacity of 25,000 tons; this department is equipped with 10 to 26-inch trains; also makes steel tubes, lock-seam pipe, light and heavy pressed and stamped steel articles, and hydraulic forgings; also operates a machine shop for the manufacture of mill and stamping machinery, dies, etc., for the use of the company. F. A. Wilmot, President and Treasurer; C. D. S. Miller, Vice President; A. J. Middlebrook, Secretary and Assistant Treasurer; H. W. Hincks, Assistant Secretary.

Collins (The) Company, Collinsville. Established in 1826; 2 scrap and 4 heating furnaces, 2 trains of rolls, (one 12 and one 18-inch,) 2 steam hammers, three 20-gross-ton steel-cementing furnaces, 2 Siemens gas crucible steel-melting furnaces, (one 24-pot and one 30-pot,) and 4 gas producers; steam and water power; product, bar iron and cast steel, all consumed by the company in the manufacture of "Collins" edge tools, steel plows, etc.; annual capacity of finished iron, 3,000 tons; of crucible steel ingots, 4,000 tons. Fuel, coal and manufactured gas. William Hill, President, Collinsville; Meigs H. Whaples, Secretary and Treasurer, Hartford.

Farist (The) Steel Company, Bridgeport. Built in 1868; enlarged since; 9 heating furnaces, 4 trains of rolls, (10, 12, 15, and 16-inch,) 6 hammers, and one 24-pot Siemens gas crucible steel-melting furnace; product, rolled and hammered crucible steel; also rerolls and hammers open-hearth and Bessemer steel; annual capacity, single turn, 1,800 tons of crucible ingots, 9,000 tons of rolled products, and 500 tons of forged products. Fuel, manufactured gas and coal. A spring shop for the manufacture of spiral springs and elliptic railroad springs added in 1883; enlarged in 1900 and 1902. Brand, "The Farist Steel Co." J. Windsor Farist, President; George Windsor, Secretary and Treasurer. Selling agent, John S. Brewer, Chicago, Illinois.

Malleable Iron Fittings Company, Branford. One 20-gross-ton acid open-hearth steel furnace built in 1896 and first steel made in that year; product, steel castings for machinery, bicycle, and gun work; annual capacity, 1,400 tons. One 3-gross-ton Tropenas converter with one cupola added in 1906; first blow made August 9, 1906; product, castings for water, steam, and gas fittings; annual capacity, 1,300 tons. A second 3-gross-ton Tropenas converter may be added. Fuel, manufactured gas. Also makes semi-steel castings; daily capacity, 5 tons. Malleable iron castings are also made; daily capacity, 35 tons. A shop for finishing malleable iron pipe fittings is connected with the works. A. C. Walworth, President; L. J. Nichols, Secretary; A. E. Hammer, Treasurer and Manager; V. T. Hammer, Assistant Treasurer and Superintendent.

National Steel Foundry Company, New Haven. Controlled by the National Steel and Wire Company.—*See page 110.*

National (The) Wire Corporation, New Haven. Controlled by the National Steel and Wire Company.—*See pages 110-11.*

New Haven Rolling Mill, New Haven Iron and Steel Company, New Haven. Completed in August, 1871; 8 puddling and 7 heating furnaces, 6 trains of rolls, (one 8, two 10, one 16, and two 18-inch,) and one hammer; uses scrap iron and rerolls steel billets; product, bars, small nut and bolt rods, and special shapes; annual capacity, 25,000 tons. Fuel, coal. Brand, "N. H." C. C. Kauffman, President; Arthur B. Crossan, Secretary and Treasurer; J. E. Schall, General Manager.

Number of rolling mills and steel works in Connecticut: 8. Of these one makes Tropenas steel, 3 make open-hearth steel, 2 make crucible steel, and one makes blister or cemented steel.

NEW YORK.

COKE AND MIXED ANTHRACITE AND COKE FURNACES—24 COMPLETED, 2 BUILDING, AND 1 PROJECTED.

Breaker Island Furnaces, American Steel and Wire Company of New Jersey, Cleveland. Furnaces on Breaker Island, opposite Troy, N. Y. Three stacks; fuel, anthracite coal and coke.—*See page 42.*

Buffalo and Susquehanna Iron Company, Erie County Bank Building, Buffalo. Two stacks, each 80 x 20, built in 1902-4; No. 1 blown in September 27, 1904, and No. 2 July 5, 1905; eight Kennedy one-pass stoves, each 102 x 22; fuel, coke; ore, Lake Superior, partly mined by the company; product, foundry pig iron; total annual capacity, 225,000 tons. Brand, "Susquehanna." William A. Rogers, President; S. M. Clement, First Vice President; C. W. Goodyear, Second Vice President; Hugh Kennedy, General Manager; Harry D. Carson, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, St. Louis, Chicago, Pittsburgh, and Philadelphia.—*Both active in 1907.*

Buffalo (The) Union Furnace Company, Buffalo. Three stacks; fuel, coke.—*See page 114.*

Burden Furnace, The Burden Iron Company, Troy. One stack; fuel, mixed anthracite coal and coke and occasionally coke alone.—*See page 112.*

Franklin Furnace, Franklin Iron Manufacturing Company, Franklin Springs; Buffalo offices, Ellicott Square. One-stack, 70 x 15, built in 1871 and remodeled in 1883; idle for several years; operations

resumed in 1899; fuel, coke; ore, fossiliferous red hematite from the mines of the company at Clinton, N. Y.; product, foundry pig iron; annual capacity, 30,000 tons. Brand, "Franklin." A. E. Hedstrom, President, Buffalo, N. Y.; T. B. Walker, Manager, Franklin Springs. Selling agents, Nash, Isham & Co., New York.
—*Active in 1907.*

Genesee Furnace, Genesee Furnace Company, Perry-Payne Building, Cleveland. Furnace at Charlotte, N. Y. One stack, 75 x 18½, built in 1868 and rebuilt in 1884, 1902, and 1905; four brick stoves; fuel, coke; ore, Lake Superior; product, foundry pig iron, adapted for stove plates and general foundry purposes, and Bessemer, malleable, and gray forge pig iron; annual capacity, 80,000 tons. Brand, "Genesee." Adding one McClure stove, 85 x 19. James Corrigan, President; Price McKinney, Vice President; J. E. Ferris, Secretary and Treasurer; A. P. McClure, Superintendent. Selling agents, Corrigan, McKinney & Co., Perry-Payne Building, Cleveland.—*Active in 1907.*

Lackawanna Furnaces, Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Furnaces at Lackawanna. Seven stacks; fuel, coke.—*See page 99.*

New York State Steel Company, White Building, Buffalo. Building: one stack, No. 1, to be 85 x 21; construction commenced in November, 1906; four McClure hot-blast stoves, each 105 x 21; fuel, coke; ores, Mesabi and old range; product, basic pig iron; estimated annual capacity, 150,000 tons. A second furnace may be added.—*Will probably be completed in January, 1908. For a list of officers see New York State Steel Company, page 247.*

Niagara Furnaces, Tonawanda Iron and Steel Company, North Tonawanda. Two stacks: Furnace A, 76 x 18, built in 1873 and rebuilt in 1890-1; Furnace B, 80 x 18, built in 1895 and blown in November 5, 1896; seven Cowper-Kennedy stoves, three 70 x 18 and four 80 x 18; fuel, coke; ore, hematite from Lake Superior; product, foundry, forge, and malleable pig iron; total annual capacity, 165,000 tons. Brands, "Niagara" and "Tonawanda Scotch." William A. Rogers, President; D. B. Gamble, Vice President; William M. Mills, Treasurer; W. T. Shepard, Secretary; W. B. Kerr, General Manager. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Both active in 1907.*

Northern Iron Company, 615 Girard Trust Building, Philadelphia. Two leased furnaces in New York: Northern Furnace, at Port Henry; one stack, 69½ x 17, built in 1872-3 and first blown in August 12, 1875; one Whitwell stove, 45 x 22, and three Cowper stoves, each 81 x 16; fuel, coke alone and occasionally anthracite coal and coke mixed; ores, Old and New Bed Port Henry mag-

netic; product, basic, malleable, foundry, and Bessemer pig iron; annual capacity, 63,000 tons; brand, "Essex;" F. E. Bachman, Manager, Port Henry; (owned by Witherbee, Sherman & Co., Incorporated.) Standish Furnace, at Standish; one stack, built in 1886 and first blown in with charcoal as fuel in February, 1887; original size, 60 x 10½; abandoned in 1902; rebuilt in 1902-3, size changed to 62½ x 12, and blown in October 20, 1903; during this blast charcoal alone, coke alone, and anthracite coal and coke mixed were used; again rebuilt in 1905 and blown in with coke alone November 5, 1905; present size, 80 x 15½; four Cowper stoves, each 71 x 16; fuel, coke; ore, Chateaugay magnetic concentrates; product, Bessemer, low-phosphorus, and malleable pig iron; annual capacity, 50,000 tons; brand, "Chateaugay;" L. P. Ross, Superintendent; (owned by the Delaware and Hudson Company, Chateaugay Ore and Iron Department.) Officers of the Northern Iron Company: Theron I. Crane, President, and W. S. Pilling, Secretary and Treasurer, Girard Trust Building, Philadelphia; F. E. Bachman, General Manager, Port Henry, N. Y. Selling agents, Pilling & Crane, Philadelphia.—*Both active in 1907.*

Poughkeepsie Iron Company, A. E. Tower, Agent and Treasurer, Poughkeepsie. Two stacks: one, 60 x 15½, built in 1860, and the other, 70 x 16, built in 1860 and rebuilt in 1893; five Gordon stoves; fuel, anthracite coal and coke; ores, Lake Superior hematite, Dutchess county brown hematite, and Port Henry magnetic; product, foundry, forge, and white and mottled pig iron; total annual capacity, 75,000 tons. Brands, "Poughkeepsie" and "Pokeepsie." A. E. Tower, President, Treasurer, and Agent; H. N. Brinsmade, Secretary. Selling agents, Crocker Brothers, 99 John st., New York.—*Last active in 1903.*

Wickwire Furnace, Wickwire Steel Company, 532 White Building, Buffalo. Building: one stack, to be 80 x 19; construction commenced August 2, 1907; four Julian Kennedy central-combustion stoves, each 80 x 20; fuel, coke; ore, Lake Superior; product, basic pig iron; estimated annual capacity, 100,000 tons. Brand, "Wickwire." The pig iron made by this furnace will be chiefly consumed in the open-hearth steel department of Wickwire Brothers, Cortland, N. Y. T. H. Wickwire, President; T. H. Wickwire, Jr., Secretary and Treasurer; H. J. Woodmansee, General Manager; Joseph W. Kennedy, Superintendent.—*Will probably be completed and ready for operation in 1908.*

Number of mineral fuel furnaces in New York: 24 completed stacks, 2 stacks building, and one stack projected. Of these 17 use coke alone, 2 coke furnaces are being built, and one coke furnace is

projected; one uses coke alone and occasionally anthracite coal and coke mixed, one uses anthracite coal and coke mixed and occasionally coke alone, and 5 use anthracite coal and coke mixed.

CHARCOAL FURNACES—2.

Chatham Furnace, Union Iron and Steel Company, New York.

Furnace at Chatham. One stack; fuel, charcoal.—*See page 113.*

Copake Iron Works, W. A. Miles, proprietor, Copake Iron Works P. O., Columbia county. One stack, 32 x 9, built in 1872; cold and warm blast; open top; iron stoves; fuel, charcoal; ore, Dutchess county; product, pig iron for gun castings, gun carriages, car wheels, chilled rolls, and malleable castings; specialties, pig iron for gun castings, with a tensile strength of from 30,000 to 40,000 pounds, and also for car wheels; annual capacity, 5,000 tons. Brand, "Copake." An iron foundry with an annual capacity of 500 tons and works for the manufacture of chilled plows are connected with the furnace. (Formerly operated by the Copake Iron Company.)—*Last active in 1903.*

Number of charcoal furnaces in New York: 2 stacks.

ELECTRIC PLANTS.

Niagara Falls Works, Electro Metallurgical Company; general offices, 157 Michigan ave., Chicago; New York offices, 79 Wall st. Works at Niagara Falls. Built in 1906 and enlarged in 1907. Equipped with furnaces for the manufacture by electricity of ordinary ferro-chromium, high-grade ferro-silicon, low carbon ferro-chromium, low-carbon ferro-tungsten, ferro-vanadium, ferro-molybdenum, and other ferro alloys and electro-metallurgical products; electricity generated by water power. W. P. Martin, President, E. F. Price, Vice President and General Manager, and J. S. Jackson, Secretary, 157 Michigan ave., Chicago; G. W. Mead, Treasurer, 79 Wall st., New York.—*Active in 1907. See Kanawha Falls Works in West Virginia, page 330.*

Titanium (The) Alloy Manufacturing Company, Niagara Falls. Built in 1907 and first put in operation on August 17, 1907; equipped with furnaces for the manufacture by electricity of titanium alloys, (including those used for iron, steel, copper, etc.) vanadium, and other alloys; annual capacity, about 1,500 tons. William F. Meredith, President, 15 Wall street, New York.—*Active in 1907.*

Number of plants which make ferro-chromium, ferro-vanadium, titanium, and other alloys by electricity: 2.

Total number of furnaces in New York: 26 completed stacks, 2 stacks building, and one stack projected. Of these 17 use coke

alone, 2 coke furnaces are being built, and one coke furnace is projected; one uses coke alone and occasionally anthracite coal and coke mixed, one uses anthracite coal and coke mixed and occasionally coke alone, 5 use anthracite coal and coke mixed, and 2 use charcoal. In addition 2 plants make ferro-chromium, ferro-vanadium, titanium, and other steel alloys by electricity.

BLOOMARIES—1.

Sizer Forge Company, Buffalo. Built in 1872 and enlarged in 1900, 1903, 1905, 1906, and 1907; 10 heating furnaces and 8 steam hammers ranging from 1,500 pounds to 10 tons; steam and electric power; product, hammered iron slabs and iron, steel, and nickel-steel forgings of all kinds up to 30 tons in weight; specialty, crank shafts, marine forgings, and smooth forged round bars; annual capacity, 12,000 tons. Fuel, coal. Machine shops and smith shops are connected with the works. S. S. Sizer, President; DeW. Clinton, Vice President; J. Y. Sloan, Secretary; C. B. Porter, Treasurer; V. B. Lyman, Works Manager. Number of bloomaries in New York: one. There are now no active forges in New York which make iron direct from the ore.

ROLLING MILLS AND STEEL WORKS—30 COMPLETED AND 2 BUILDING.

Albany Iron and Steel Works Department, The Rail Joint Company, New York. Works at Troy, N. Y.—*See page 116.*

Auburn Iron Works, Charles W. Tuttle, Auburn. Built in 1853; 2 heating furnaces, one 10-inch train of rolls, and one hammer; use scrap iron only; product, merchant bar and horseshoe iron; annual capacity, 4,000 tons. Fuel, bituminous coal. Brand, "Auburn." (Formerly operated by C. W. Tuttle & Co.; acquired by Charles W. Tuttle on August 3, 1907.)

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. One 2-gross-ton Tropenas steel converter and one cupola built in 1904 and first steel made December 19, 1904; product, steel castings for ship work for the use of the United States Navy; annual capacity, about 1,200 tons. Fuel, coke.

Buffalo Crucible Casting Company, 25 Washington st., Buffalo. Built in 1906; one 40-pot crucible steel-melting furnace; 40 pots can be used at a heat; first crucible steel made May 1, 1906; product, crucible steel ingots and castings; annual capacity, 4,000 tons. Fuel, producer gas. J. L. Osgood, President; S. B. Sheldon, Vice President; Alfred W. Thorn, Secretary and Treasurer; A. S. Capwell, General Manager.

Buffalo Steel Company, Tonawanda. Built in 1900 and put in

operation in August, 1900; one continuous heating furnace and two 14-inch trains of rolls; product, Bessemer steel bars, angles, channels, tees, and special shapes for agricultural implements and other purposes; annual capacity, 30,000 tons. Fuel, coal and coke. L. E. Block, President; J. G. Joseph, Vice President and Treasurer; P. T. Large, Secretary.

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo. Original works built in 1861 and first crucible steel made in that year; open-hearth furnaces added in 1876 and first open-hearth steel made in that year; plant now contains three 15-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 17,000 tons. Fuel, oil. Malleable iron castings are also made. O. P. Letchworth, President; W. C. Houck, Secretary; Josiah Letchworth, Treasurer.

Burden Iron Works, The Burden Iron Company, Troy, New York.
—See page 112.

Burgess & Dickinson, Dunkirk, Chautauqua county. Building; to be equipped with one 12-pot crucible steel-melting furnace and 3 hammers (one 650-lb., one 1,500-lb., and one 5,000-lb.); the capacity of the crucible steel-melting furnace can be enlarged to 24 pots; product, crucible steel ingots which will be hammered into bars, squares, rounds, flats, octagons, hexagons, etc., for tools, drills, lathes, punches, dies, etc.; annual capacity, 600 tons. Fuel, coal and natural gas.—*Will probably be ready for operation early in 1908.*

Cohoes Rolling Mill, Cohoes Rolling Mill Company, Cortland and Canvass sts., Cohoes. Built in 1854; burned and rebuilt in 1883; 11 double puddling furnaces, 4 coal scrap furnaces, 4 gas heating furnaces, and 3 trains of rolls (one 10, one 16, and one 21-inch); water power; product, skelp and refined bar iron; specialties, high-grade iron for edge tools, butts, hinges, and boiler flues; annual capacity, 30,000 tons. Fuel, coal and producer gas. A plant for the manufacture of wrought-iron pipe is connected with the works; sizes, from $\frac{1}{4}$ of an inch to 2 inches inclusive; annual capacity, 25,000 tons. A department for galvanizing wrought-iron pipe was added in 1905. George H. Page, President and Treasurer; Samuel T. Page, Vice President; Albert W. Powers, Secretary.

Drew Steel Foundry, E. H. Drew, owner, Carlton Place, Lockport. One crucible steel-melting furnace built in 1892 and first steel made in that year; number of pots, 4; product, steel castings; annual capacity, 100 tons. Fuel, coke. John Drew, Manager.

Eckels-Nye Steel Company, Syracuse. Built in 1899 and first put in operation in that year; 2 Sweet heating furnaces and one 13-

inch train of rolls; product, Bessemer and high-carbon merchant steel; annual capacity, single turn, 8,000 tons. Fuel, bituminous coal. Peter Eckel, President; Philip Eckel, Vice President; Francis H. Nye, Jr., Secretary and Treasurer.

Elmira Rolling Mill, Federal Rolling Mill Company, lessee, D. S. Morgan Building, Buffalo. Works at Elmira Heights. Built in 1902 and first put in operation in September, 1902; one double puddling furnace, 2 single puddling furnaces, 4 busheling furnaces, 2 coal heating furnaces, and 3 trains of rolls (one 3-high 18-inch muck and one 10 and one 16-inch Belgian finishing); product, merchant bar iron, including rounds and squares, flats, bands, hexagons, and round edge, horseshoe, rivet, and staybolt iron; annual capacity, 15,000 tons. Fuel, bituminous coal. Gustave Benjamin, President, General Manager, General Sales Manager, and Purchasing Agent; Moses Shire, Vice President; Edward L. Jellinek, Secretary and Treasurer. (Owned and formerly operated by the Elmira Rolling Mill Company; leased by the Federal Rolling Mill Company on November 1, 1906.)

Elmira Steel Works, Lucknow Iron and Steel Company, lessee, Harrisburg, Pa. Works at Elmira, N. Y.—*See pages 114-15.*

Gould Coupler Company's Steel Plant, Gould Coupler Company, Depew, New York, and No. 1 West Thirty-fourth st., New York; branch offices, Rookery Building, Chicago. Works at Depew. Built in 1903; 4 annealing furnaces and four 25-net-ton basic Wellman open-hearth steel furnaces; first steel made November 30, 1903; product, all kinds of steel castings; annual capacity, 50,000 tons. Fuel, coal and producer gas. Also makes malleable castings, locomotive and car axles, etc. Charles A. Gould, President; Charles M. Gould, Vice President; F. P. Huntley, Secretary; William S. Gould, Treasurer.

Halcomb Steel Company, Syracuse. Built in 1905-6 and first put in operation in 1906; five 24-pot crucible steel-melting furnaces with 120 pots, one 4-gross-ton electric furnace, one 20-gross-ton basic open-hearth steel furnace, 7 gas producers, 21 heating furnaces, 6 annealing furnaces, 5 trains of rolls, (one 9, one 12, and one 14-inch bar and two 18-inch sheet,) and 9 steam hammers (one 12,000-lb., one 8,000-lb., one 5,000-lb., two 4,000-lb., one 2,000-lb., one 1,500-lb., one 1,000-lb., and one 600-lb.); also equipped with a complete wire and bar drawing and cold-rolling department; product, hammered and rolled bars, sheets, forgings, fine wire, drill rods, drawn shapes, and cold-rolled bars and strips; specialty, the finest quality of tool steel; annual capacity, 20,000 tons of ingots and finished rolled, forged, and drawn products. Fuel, coal and oil. C. H. Halcomb, President;

F. B. Scott, Vice President; F. E. Wade, Secretary; F. R. Hazard, Treasurer; L. C. Smith, Chairman.

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York. Crucible steel plant erected in 1880; four 5-pot crucible steel-melting holes; annual capacity, 180 tons of crucible steel castings. Open-hearth steel plant erected in 1882; two 8-gross-ton acid furnaces; annual capacity, single turn, 4,000 tons of open-hearth steel castings. Two 2-gross-ton Tropenas converters added in 1903; first steel made June 1, 1903; 4 cupolas; product, general machinery castings and special electric metal of high permeability; annual capacity, 3,000 tons. Fuel, coal. Elias M. Johnson, President; Isaac B. Johnson, Vice President; Gilbert H. Johnson, Treasurer; James W. Johnson, Secretary; Arthur G. Johnson, General Manager.

Lackawanna Steel Works, Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna.—*See pages 99-100.*

Ludlum (The) Steel and Spring Company, Watervliet. Construction commenced in the fall of 1906; to be equipped with two 30-pot crucible steel-melting furnaces, hot trains of rolls, and several hammers; machinery now in the company's plant at Pompton, N. J., will be largely used in equipping these works. H. A. Peckham, President; James W. Cox, Jr., Vice President; William E. Ludlum, Secretary and Treasurer.—*See The Ludlum Steel and Spring Company, page 253.*

Manhattan Rolling Mill, Incorporated, 362 Avenue A, New York. Built in 1892 and first put in operation September 1, 1892; 2 heating furnaces and 2 trains of rolls (one 10 and one 18-inch); product, horseshoe iron and horseshoes; annual capacity, single turn, 2,500 tons of horseshoe iron and refined bar iron. Fuel, bituminous coal. Brand for horseshoe iron, a horseshoe inclosing the letters "J. L." John Leonard, President; Michael Blake, Vice President; Frank D. Cadmus, Secretary and Treasurer. (Owned by John F. Hanley, 520 East Twenty-third street, New York.)

Milliken Steel Works, Milliken Brothers, (Incorporated,) 11 Broadway, New York; branch offices, Honolulu, H. T.; Mexico City, Pittsburgh, San Francisco, Portland, Oregon, and Havana, Cuba. Works on tidewater, Milliken, Staten Island, N. Y. Construction commenced January 15, 1906; five 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 180,000 tons of ingots, 2 continuous heating furnaces, and 3 trains of rolls (one 40-inch blooming, one 2-high 32-inch reversing roughing, and one 3-high 28-inch reversing structural); first steel ingots made October 24,

1906, first blooms and billets rolled November 23, 1906, and first structural shapes rolled January 25, 1907; product, steel ingots, castings for the use of the company, slabs, blooms, billets, beams from 5 to 24 inches, channels from 4 to 18 inches, angles from $2\frac{1}{2}$ x $2\frac{1}{2}$ to 8 x 8 inches, zee bars from 3 to 6 inches, and bars and flats rolled in grooved rolls from 6 to 24 inches wide; annual capacity, 150,000 tons. Fuel, anthracite and bituminous coal and producer gas, the latter used in the open-hearth and reheating furnaces. Brand, "Milliken." Foundations for a sixth 50-gross-ton basic open-hearth furnace have been built. The company also operates a bridge and structural plant which is equipped for the erection of iron and steel bridges and buildings and for the manufacture of all kinds of structural steel and iron work; annual capacity, 65,000 tons. It also operates small iron and brass foundries which produce castings for the use of the company; also machine and forge shops. August Heckscher, William L. Ward, and J. Van Vechten Olcott, Receivers, 11 Broadway, New York. Selling agencies, 11 Broadway, N. Y.; 509 Eddy st., San Francisco; 815 Chamber of Commerce Building, Portland, Oregon.

New York State Steel Company, White Building, Buffalo. Built in 1905-7; two 200-gross-ton Talbot basic open-hearth steel furnaces with an annual capacity of from 100,000 to 120,000 tons of ingots; first open-hearth steel made April 18, 1907; three 4-hole soaking pits, 19 gas producers, 2 cupolas, and one 2-high 36-inch blooming mill; first products rolled April 18, 1907; product, ingots, billets, blooms, and slabs; annual capacity, from 100,000 to 120,000 tons of rolled products. Fuel, producer gas. The company is now building a blast furnace at Buffalo. When it is completed molten metal will be used in the open-hearth furnaces. A machine shop is connected with the works. Spencer Kellogg, President; Spencer Kellogg, Jr., Vice President; Howard Kellogg, Secretary; Stuart R. Mann, Treasurer. Receivers, Spencer Kellogg, George Urban, Jr., and Adolph Rebadow.—*See Blast Furnaces*, page 240.

Niagara Forged Steel Company, White Building, Buffalo. Works at Depew. Built in 1907; one 2-gross-ton basic open-hearth steel furnace and one 800-lb. hammer; first open-hearth steel made in November, 1907; product, open-hearth steel ingots and castings, billets for forge shop use, rail braces, combination tie plate and rail braces, tie plates, anti-spreading devices, brake beams, and general forgings; annual capacity, 8,000 tons of ingots and castings and 5,000 tons of forged products. Fuel, coal tar and fuel oil. Also operates a plant at Depew which is equipped for the manufacture of track equipment and rail-

road and general forgings of every description. W. H. Woodcock, President and General Manager; S. A. Holbrook, Vice President; George M. Stowe, Sr., Secretary and Assistant Treasurer; H. E. Gaffney, Treasurer.

Osborne Works Rolling Mill, International Harvester Company, Chicago. Works at Auburn, N. Y.—*See page 209.*

Poughkeepsie Works, Phoenix Horse Shoe Company, Chicago. Works at Poughkeepsie, N. Y.—*See page 117.*

Rippel (E. G.) Steel Foundry Company, 31-39 Indiana st., Buffalo. Built in 1906-7; five 4-pot crucible steel-melting furnaces; total number of pots that can be used at a heat, 20; first steel made January 2, 1907; product, steel castings; annual capacity, 1,000 tons. Fuel, oil. E. G. Rippel, President and Treasurer; J. V. Rippel, Secretary.

Rome Merchant Iron Mill, Rome. Incorporated in 1868 and first put in operation in June, 1869; destroyed by fire in February, 1905; rebuilt and again put in operation September 6, 1905; 8 double puddling furnaces, one scrap furnace, 4 bar heating furnaces, 3 trains of rolls, (8, 12, and 18-inch,) and 5 shears; product, best high grades of merchant puddled bars for forging and machine-shop work, and staybolt, engine-bolt, horseshoe, hexagon, beveled-edge, tire, screw, hoop, and band iron; special high-grade refined iron branded "Rome," a superior quality of engine-bolt iron branded "J. G.," and an extra quality of staybolt iron branded "XX;" annual capacity, single turn, 12,000 tons. Fuel, coal. A small machine shop is connected with the works. Jim Stevens, President; Samuel B. Stevens, Vice President; Charles W. Lee, Secretary, Treasurer, and General Sales Manager. Selling agents, Fitz Dana & Co., Boston, and C. S. Mersick, New Haven, Conn.

Sanderson Brothers Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Syracuse, N. Y.—*See page 165.*

Seneca Iron and Steel Company, Erie County Bank Building, Buffalo. Works at South Buffalo. Construction commenced in February, 1907; partly completed and put in operation October 7, 1907; 7 sheet, 7 pair, and 4 annealing furnaces, 7 hot sheet mills, (one 26 x 34-inch, five 26 x 38-inch, and one 26 x 48-inch,) and 4 cold sheet mills (one 24 x 52-inch and three 24 x 44-inch); product, all kinds of black and galvanized sheet iron; annual capacity, 30,000 tons. Fuel, coal and producer gas. A galvanizing plant with 3 pots is connected with the works; annual capacity, 17,000 tons of sheets. James S. Paterson, President; Hugh Kennedy, Vice President; H. M. Van Horn, Secretary; Alexander Paterson, Treasurer and General Manager; S. B. E. McVay, Sales Manager.

Standard Rolling Mill, M. J. Dempsey, Fortieth st. and Eleventh

ave., New York. Built in 1891; 2 coal heating furnaces and 2 trains of rolls (10 and 18-inch); product, merchant bars, angles, and horseshoe iron; annual capacity, 6,000 tons. Fuel, coal. Brand, "Standard." William S. Dempsey, Superintendent.

Westerman Rolling Mill, Westerman & Co., Lockport. Built in 1870; 4 heating furnaces and 2 trains of rolls (9 and 16-inch); steam and water power; product, horseshoe iron, rounds, squares, hexagons, and fancy shapes of all kinds; annual capacity, 8,000 tons. Fuel, coal. C. G. Sutliff, Manager.

Wickwire Brothers, Cortland. Built in 1900-1 and first put in operation February 1, 1901; one heating furnace, one double wire-rod train, a large number of wire-drawing blocks, and 100 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 40,000 tons of wire rods, 15,000 tons of wire, and 120,000 kegs of wire nails. Also manufacture wire cloth, wire goods, etc. Steel plant added in 1902-3; two 30-gross-ton Wellman basic open-hearth steel furnaces and 8 Morgan gas producers; first steel made about February 1, 1903; one 25-inch reversing blooming mill and one heating furnace; product, ingots and billets; annual capacity, 36,000 tons of ingots and 36,000 tons of billets. Fuel, coal and producer gas. Chester F. Wickwire, President; E. Stilson, Secretary; Theo. H. Wickwire, Treasurer; C. C. Wickwire, Purchasing Agent.

Wurster (F. W.) & Co., 375-93 Kent ave., Brooklyn. Built in 1890 and put in operation in 1891; 3 heating furnaces and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron; annual capacity, 12,000 tons. Fuel, coal. Brand, "F. W. W. & Co." F. W. Wurster, Manager.

Number of rolling mills and steel works in New York: 30 completed and 2 building. Of these one makes Bessemer steel, 2 make Tropenas steel, 10 make open-hearth steel, one open-hearth steel plant is projected, 6 make crucible steel, 2 crucible steel plants are being built, and one makes steel by electricity.

NEW JERSEY.

COKE ALONE AND MIXED ANTHRACITE COAL AND COKE FURNACES—11.

Andover Iron Works, Andover Iron Company, Phillipsburg. One stack; fuel, coke and occasionally some anthracite coal mixed with coke. (Owned by Joseph Wharton.)—*See page 118.*

Hackettstown Furnace, Carteret Steel Company, John S. Gibson, Receiver, 432 Prudential Building, Newark. Furnace at Hackettstown. One stack, 60 x 15, built in 1874-5 and put in blast

in 1875; idle for several years; rebuilt and revived in 1899; Kent stoves; fuel, coke; ores, principally New Jersey magnetic and concentrates; product, miscellaneous grades of pig iron; annual capacity, 35,000 tons.—*Last active in 1902. Idle and for sale or lease.*

Musconetcong Furnace, Musconetcong Iron Works, Stanhope; executive offices, Elizabeth, N. J. One stack, No. 2, 80 x 17, built in 1871 and rebuilt in 1900; three Hartman-Kennedy fire-brick stoves, each 79 x 19, and one equalizer; fuel, anthracite coal and coke; ores, New Jersey magnetic, Lake Superior, Cuban, and other foreign; product, foundry, forge, and malleable Bessemer pig iron; annual capacity, 50,000 tons. Brand, "Musconetcong." Equipped with one Hartman pig-iron casting machine. Douglas Alexander, President, E. H. Bennett, Vice President, and T. T. Grover, Treasurer, Elizabeth; John S. Kennedy, Manager, Stanhope.—*Active in 1907.*

Newark Furnaces, The New Jersey Zinc Company, 71 Broadway, New York. Furnaces at Newark, N. J. Two stacks; fuel, anthracite coal and coke.—*See page 120.*

Oxford Furnace, Empire Steel and Iron Company, Catasauqua, Pa. Furnace at Oxford, N. J. One stack; fuel, anthracite coal and coke.—*See page 128.*

Pequest Furnace, Pequest Company, 17 Burling Slip, New York. Furnace and mines at Buttzville, N. J. One stack, 67 x 16, built in 1874 and rebuilt in 1883; Durham iron-pipe stoves; fuel, $\frac{1}{2}$ anthracite coal and $\frac{1}{2}$ coke; ores, New Jersey magnetic and man-ganiferous, about 80 per cent. of which is mined by the company; product, foundry, forge, basic, and high-manganese pig iron; annual capacity, 25,000 tons. Brand, "Pequest." James O. Green, President; Peter Cooper Hewitt, Vice President; Erskine Hewitt, Secretary; Charles E. Hewitt, Treasurer; James P. Anderson, General Manager. Sales made by the company at 17 Burling Slip, New York. (Owned by the Hewitt Estate.)—*Active in 1907.*

Secaucus Furnace, Hudson Iron Company, 100 Broadway, New York. Furnace at Secaucus, N. J.; telegraph address, Rutherford, N. J. One stack, 85 x 16, completed in 1877 and first blown in in June, 1879; idle for a number of years; revived in 1903 and blown in July 9 of that year; four iron-pipe stoves; fuel, anthracite coal and coke; ores, magnetic from the company's mines at Fort Montgomery, N. Y., limonite from the company's mines at Beatyestown, N. J., and Lake Superior; product, foundry and forge pig iron; annual capacity, 36,500 tons. Brand, "Hudson." Frank A. Wilmot, President, Bridgeport, Conn.; Harold G. Villard, Vice President, and J. M. Clark, Secretary and Treasurer, New York; Albert Trinler, General Manager, Secaucus.

Selling agents, William F. Converse & Co., 100 Broadway, New York. (Formerly operated under lease by the Eastern Iron Company; acquired by the Hudson Iron Company from the Hackensack Meadows Company on June 11, 1904.)—*Active in 1907.*

Wharton Furnaces, Joseph Wharton, Philadelphia. Furnaces at Wharton, N. J. Three stacks; fuel, coke and occasionally some anthracite coal mixed with coke.—*See page 117.*

Number of furnaces in New Jersey: 11. Of these 6 use mixed anthracite coal and coke, one uses coke alone, and 4 use coke and occasionally anthracite coal mixed with coke. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—25 COMPLETED AND 1 PROJECTED.

American Horse Shoe Company, Phillipsburg. Originally built in 1865; acquired by present owners in 1895; now equipped with 6 heating furnaces and 4 trains of rolls (three 9-inch guide and one 18-inch bar); product, a superior grade of horseshoe bars; specialty, horseshoes and toe-calks; annual capacity, 10,000 tons of iron and steel bars. Fuel, coal. Brand, the letter "A" in a circle. Charles H. Holton, President; Philip S. Dyer, Secretary and Treasurer.

American Steel Corporation, Oxford, Warren county. Built in 1906-7; one 8,000-pound Wills converter and 2 cupolas; first steel made October 17, 1907; product, steel castings; estimated annual capacity, 9,000 tons. Fuel, coke and oil. A second converter is being added. Also makes gray iron and brass castings. A machine shop is connected with the works. E. Cooper Wills, President and General Manager; Leslie C. Hillard, Secretary; Robert M. Petty, Treasurer. (Formerly operated by the Delaware and Lackawanna Steel Company; acquired by the present owners on November 12, 1907.)

Atha Steel Casting Company, Newark. Began operations as Prentiss, Atha & Co. in 1864 and first crucible steel made April 1, 1864; manufacture of crucible steel discontinued in 1900; name changed to Benjamin Atha & Co.; open-hearth department added in 1879 and a steel-casting department in 1884; first acid open-hearth steel made in 1879 and first basic open-hearth steel in 1898; present plant contains three 25-gross-ton open-hearth steel furnaces (2 basic and one acid). Bessemer steel department added in 1901 and first steel made in September, 1901; three 1½-gross-ton top-blown Bessemer converters. Product, steel castings exclusively; annual capacity, 9,000 tons of acid and 18,000 tons of basic open-hearth castings and 3,000 tons of top-blown castings. Fuel, oil and manufactured gas. Benjamin Atha and

Ernest F. Harder, Newark, and George W. Hebard, Brooklyn, Receivers; Louis A. Shepard, Manager, and A. S. Blanchard, Assistant to Manager, Newark. (Formerly operated by Benjamin Atha & Co.; acquired by the Atha Steel Casting Company on May 1, 1906.)

Atha Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Harrison, N. J.—*See page 163.*

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton. Built originally in 1825 and enlarged several times; now equipped with 9 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 9-inch with 14-inch roughing, one 16-inch, and one 18-inch); product, bar iron and angles; annual capacity, 25,000 tons. Fuel, bituminous coal. Brand, "Boonton." Charles Brock, President; R. A. Anthony, Vice President; A. P. Smith, Secretary and Treasurer. (Owned by the Estate of J. Couper Lord; Benjamin Nicoll, Secretary, 59 Wall street, New York.)

Chrome Steel Works, Chrome; telegraph address, Carteret; President's office, 11 Pine st., New York. Built in 1902-4 and first put in operation March 19, 1904; 7 coal and gas heating furnaces, 2 annealing furnaces, 8 forge fires, 5 hammers, one 4,000-ton hydraulic forging press, and 6 trains of rolls (one 10 and one 12-inch bar, one 112 and one 72-inch plate and angle, and 2 tire mills); product, chrome-steel plates and angles and bars; sizes of angles, 3, 4, 6, and 8-inch; also welded chrome-steel plates and rolled shells and rings; annual capacity, 25,000 tons. Three Siemens open-hearth steel furnaces (two 15-gross-ton acid and one 30-gross-ton basic); first acid steel made March 19, 1904, and first basic steel made in November, 1905; product, ingots and castings; annual capacity, 15,000 tons. Three Siemens crucible steel-melting furnaces; number of steel-melting holes, 12; number of pots, 72; first crucible steel made March 21, 1904; product, ingots and castings; annual capacity, 4,000 tons. Fuel used in all departments, manufactured gas. A machine shop equipped with all modern appliances for all classes of work is connected with the plant. Ferdinand E. Canda, President; Charles J. Canda, F. Mora Canda, and William Corry, Vice Presidents; Charles A. Canda, Secretary; Thomas I. Jones, Treasurer.—*This company formerly operated a steel plant and a rolling mill at Brooklyn, N. Y., which was dismantled in 1905.*

Heller Brothers Company, Newark. Crucible steel works built in 1882; one 30-pot crucible steel-melting furnace; annual capacity, double turn, 2,000 tons of ingots; 8 heating furnaces, 5 hammers, (one $\frac{1}{2}$, two $\frac{1}{2}$, one 2, and one 3-ton,) and one 10-inch train of

rolls; adding 2 heating furnaces and 2 trains of rolls (one 10 and one 18-inch); will probably be completed in January, 1908; product, clay crucible steel, made into rasp, file, and high-grade tool steel; annual capacity, single turn, including additions now being made, 7,500 tons of rolled and hammered products. Fuel, bituminous coal and gas. Also makes rasps, files, high-grade tools, etc. Elias G. Heller, President; Paul E. Heller, Vice President; Arnaud G. Heller, Secretary and Treasurer; Ernest A. Geoffroy, Manager of Steel Works.

Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City. Built in 1850; one heating furnace, using producer gas, and one 10-inch train of rolls; use scrap iron only; product, spikes, splice joints, bolts, and round, flat, and square bar iron; annual capacity, 10,000 tons. Fuel, producer gas. Also operate a machine shop for making repairs to the plant.

Kinkora Works, John A. Roebling's Sons Company, Trenton, N. J. Works at Roebling, Burlington county.—*See page 121.*

Ludlum (The) Steel and Spring Company, Pompton. Built in 1863; 4 heating furnaces, 2 trains of rolls, (one 9 and one 18-inch,) and 3 hammers; 48 crucible steel-melting pots with an annual capacity of 1,800 tons of ingots; product, crucible cast steel and railway car springs; annual capacity, 1,600 tons of rolled and 200 tons of forged products. Fuel, coal. Brand, "Pompton."—*These works are to be dismantled and a part of the machinery removed to a plant the company is building at Watervliet, N. Y. See page 246.*

Mahwah Works, American Brake Shoe and Foundry Company, Mahwah. Works at Mahwah.—*See page 123.*

New Jersey (The) Steel Company, Rahway. Original plant for the manufacture of crucible steel castings built near Belleville, Essex county, by the Uniform Steel Company in 1901 and first steel made in May, 1901; abandoned in 1902; new plant for the manufacture of steel by the Evans-Wills process erected at Rahway by the same company in 1902; first steel made October 18, 1902; partly destroyed by fire in February, 1903; rebuilt and put in operation in April, 1903, and acquired by the New Jersey Steel Company in October, 1903; the present works are equipped with 3 special Bessemer converters (two 4,000-lb. and one 8,000-lb.); product, high-grade steel castings; annual capacity, 7,000 tons. Also with one 20-gross-ton acid open-hearth steel furnace built in 1905; first open-hearth steel made in July, 1906; product, steel castings; annual capacity, 9,000 tons. Fuel, coke, fuel oil, and coal. A. W. McArthur, President and General Manager; William Howard, Vice President; A. E. Williamson, Secretary; F. W. Hughes, Treasurer.

Pardee (The C.) Works, Incorporated, Perth Amboy, Middlesex county. Built in 1900 and put in operation December 1, 1900; one heating furnace and 2 trains of rolls (one 32-inch blooming and one 12-inch finishing with one set of 14-inch roughing rolls); product, steel blooms, billets, and merchant bars; annual capacity, single turn, 30,000 tons of blooms and billets and 12,000 tons of merchant bars. Two 25-gross-ton basic open-hearth steel furnaces added in 1903; first open-hearth steel made May 19, 1904; product, ingots; annual capacity, 25,000 tons. Fuel, bituminous coal in the rolling mill and producer gas in the open-hearth furnaces. Also make cold-drawn flats, shafting, etc. Ario Pardee, President; A. D. Pardee, Vice President; Howard Pardee, Treasurer; Charles F. Eilert, Secretary.

Passaic Steel Company, Paterson; New York offices, 170 Broadway. Works built in 1867 and greatly enlarged in 1902-3; Passaic Rolling Mill Company incorporated in 1869 and Passaic Steel Company incorporated in 1902. Plant now equipped with 7 basic open-hearth steel furnaces, (two 50 and five 25-gross-ton,) one 3-hole and two 2-hole soaking pits, and 8 Duff gas producers; first acid steel made in December, 1889, and first basic steel in September, 1894; the two 50-ton open-hearth furnaces are equipped with one Wellman-Seaver-Morgan charging machine, one 75-ton Morgan electric ladle crane, and one Morgan electric ingot stripper; annual capacity, 125,000 tons of ingots; one blooming mill, shears, hydraulic machinery, and electric crane for operating soaking pits and delivering ingots to blooming mill tables, 4 gas heating furnaces, one Laughlin furnace, and 3 trains of rolls (one 21, one 28, and one 30-inch universal); the 21-inch mill is equipped with one Morgan electric charging machine and the 28 and 21-inch mills are equipped with transfer tables; product, beams, channels, angles, and universal mill plates; annual capacity, 100,000 tons of finished products. Fuel, manufactured gas. Brand, "Passaic." The plant includes a bridge department with a modern outfit; annual capacity, 12,000 tons. John R. Lee and William A. Arnold, Paterson, and Oakley W. Cooke, Newark, Receivers.

Reliance Steel Foundry Company, Delawanna. Built and first put in operation in 1903; one 20-gross-ton acid open-hearth steel furnace; product, steel castings; annual capacity, 12,000 tons. Fuel, gas from coal. Charles D. Thompson, Receiver, No. 1 Exchange Place, Jersey City. (Formerly called the Delawanna Foundry and operated by the Cooper, Wigand, Cooke Company; acquired by the Reliance Steel Foundry Company on August 26, 1907.)—*For sale.*

Riverside Steel Casting Company, 451-73 Riverside ave., Newark. Original works built about 1885; twelve 4-pot Siemens crucible steel-melting furnaces added in 1901 and first steel made May 20, 1901; abandoned in 1902 by the Uniform Steel Company; acquired by present owners in January, 1905, and first steel castings made February 1, 1905; product, crucible steel castings from 1 pound to 1,000 pounds; annual capacity, 600 tons. Fuel, anthracite and bituminous coal. Thomas Malcolm, President; Porter S. Kinne, Vice President; J. Smylie Kinne, Secretary and Treasurer. (Formerly operated by the Uniform Steel Company; later by the Riverside Foundry; name changed to the Riverside Steel Casting Company on January 26, 1907.)

Rockaway (The) Rolling Mill, Rockaway. Built in 1900-1 and first put in operation in May, 1901; virtually destroyed by fire February 21, 1907; immediately rebuilt; 3 heating furnaces and one tandem train of rolls with one 12-inch roughing and one 10-inch finishing mill; product, bar iron and steel; also double refined iron and staybolt iron; annual capacity, 12,000 tons. Fuel, coal. Brand, "Rockaway." Edward Ehlers, President and General Manager; Henry Ehlers, Jr., Vice President; C. C. Grover, Secretary and Treasurer. (Formerly operated by the Rockaway Iron and Steel Company; acquired by the Rockaway Rolling Mill on June 22, 1904.)

Sims-Kent Works, William H. Baker, Dover. Built in 1906; one 30-gross-ton McHaffie steel furnace; first steel made September 20, 1906; product, small steel castings; annual capacity, 5,000 tons. Fuel, anthracite coal and coke. (Formerly operated by the Sims-Kent Company; acquired by William H. Baker on September 4, 1907).—*Idle and for sale or lease.*

Singer (The) Manufacturing Company, Elizabeth. Works at Elizabethport. Built in 1903; equipped with heating furnaces, annealing furnaces, wire-drawing blocks, and hot and cold trains of rolls; product, rounds, flats, etc., for the use of the company only; estimated annual capacity, 8,000 tons. Douglas Alexander, President; E. H. Bennett, Vice President.

Spaulding-Jennings Works, Crucible Steel Company of America, Frick Building, Pittsburgh. Works at Jersey City, New Jersey.—*See pages 165-66.*

Taylor Iron and Steel Company, High Bridge. Original works built about 1720 and abandoned about 1785; a portion of the present works built in 1851 and enlarged in 1866-70; rolling mill added in 1883; one single and 2 double puddling furnaces, 4 heating furnaces, one 2-high 18-inch train of muck rolls, and one large steam helve hammer; product, muck and scrap bar for car and

locomotive axles; also car and locomotive axles and shafts and similar forgings from steel blooms; annual capacity of axles and shafts, 7,000 tons. Special furnaces for making Hadfield-Taylor steel added in 1892 and first steel made in September, 1892; product, Hadfield-Taylor manganese, nickel, chrome, and other steel castings, including armor-piercing projectiles of large and medium calibre; annual capacity, 10,000 tons. Fuel, coal and coke. Two machine shops are connected with the works. Howard E. White, President; Lewis H. Taylor, Honorary President; Percival Chrystie, Vice President; Henry Marion Howe, Second Vice President; T. F. Budlong, Secretary and Treasurer; Knox Taylor, General Manager.—*The rolling mill and forge departments are idle.*

Tremley Point Plant, American McKenna Process Company, Milwaukee, Wis. Works at Tremley Point, N. J.—*See page 124.*

Trenton Works, John A. Roebling's Sons Company, Trenton. Works at Trenton.—*See pages 121-22.*

Ulster Iron Works, Dover. Built about 1770 and rebuilt several times; 7 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 10, one 18, and one 20-inch); steam and water power; product, bar iron; annual capacity, 8,000 tons. Fuel, bituminous coal. Brands, "Ulster" and "Ulster Special." C. R. Mulligan, President; John Mulligan, Vice President and General Manager; J. D. B. Vreeland, Secretary and Treasurer.

West Jersey Tube Works, 305 Drexel Building, Philadelphia. Works at Bridgeton, N. J. Built in 1814; 8 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls (one 12 and one 18-inch); product, skelp iron; annual capacity, 12,000 tons. A tube plant connected with the works has an annual capacity of 6,000 tons of wrought-iron tubes; sizes, from $\frac{1}{8}$ of an inch to 2 inches inclusive. Fuel, bituminous coal and oil.—*Idle since 1904.*

PROJECTED STEEL PLANTS.

Devlin (Thomas) Manufacturing Company, American st. and Lehigh ave., Philadelphia. Works at Burlington, N. J. Built in 1902-3; product, malleable castings. Will add one cementation furnace for the treatment of malleable castings. Fuel, coal and coke. Thomas Devlin, President; William J. Devlin, Vice President; Louis J. McGrath, Secretary and Treasurer.

Number of rolling mills and steel works in New Jersey: 25 completed and one projected. Of these 3 make steel in Bessemer converters, (one Wills, one top-blown, and one special,) 8 make open-hearth steel, 7 make crucible steel, one makes McHaffie steel, one makes Hadfield-Taylor steel, and one plant to treat malleable iron castings by the cementation process is projected.

PENNSYLVANIA.

PHILADELPHIA CITY AND COUNTY.

Embraces Rolling Mills and Steel Works in Philadelphia and Philadelphia County. There are no blast furnaces in the City or County.

ROLLING MILLS AND STEEL WORKS—12.

Davis Brothers Rolling Mill and Spike Works, Twenty-ninth and Bristol streets, (post-office address, station "Z,") Philadelphia. Built in 1900 and first put in operation in June, 1900; 2 forge fires, 3 heating furnaces, 3 trains of rolls, (one 18-inch breakdown, one 10-inch roughing, and one 8-inch finishing,) and 11 spike machines; product, square rods, used in the manufacture of wrought-iron railroad, ship, bridge, and wharf spikes; also small even leg angles from 2 inches down to one inch; annual capacity, 10,000 tons of finished products. Fuel, anthracite and bituminous coal. Charles Gibbons Davis, Owner and Manager.

Fair Hill Rolling Mill, Gaulbert & Caskey, York and American sts., Philadelphia. Built in 1855; 5 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 16-inch puddle and one 9 and one 10-inch finishing); product, merchant bar iron; annual capacity, 12,200 tons. Fuel, bituminous coal. Brand, "Fair Hill." Ishmael James, Superintendent.

Hughes & Patterson, Richmond st. and Susquehanna ave., Philadelphia. Two works in Philadelphia: Delaware Rolling Mill, at Richmond st. and Susquehanna ave., operated by Hughes & Patterson, built in 1870; 10 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 18-inch puddle and one 8 and two 10-inch finishing). Philadelphia Iron and Tinplate Works, at Beach and Vienna sts., operated by Hughes & Patterson, Incorporated, built in 1858; 9 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls (one 18-inch puddle and one 9 and one 18-inch finishing). Product, bar iron specialties, skelp, bands, hoops, and rods; total annual capacity, 27,000 tons. Fuel, bituminous coal. Brands, "H. & P. Best," "H. & P. Best-best," and "H. & P. Staybolt." Officers of Hughes & Patterson, Incorporated: R. J. Hughes, President and Secretary; Walter Hatfield, Vice President and Treasurer.—*Philadelphia Iron and Tinplate Works idle since 1894. See Tinplate and Terne Plate Works, (Philadelphia Iron and Tinplate Works,) Part III.*

Illingworth (The John) Steel Company, 25 Cliff st., New York. Works at Frankford, Philadelphia. Built in 1835 on Tacony creek, 2 miles west of Frankford, and removed to present location in 1849; began making cemented steel in 1845; present works contain 9 heating and annealing furnaces, 5 trains of rolls, (one

- 16-inch bar roughing, one 18-inch sheet, and one 9, one 12, and one 14-inch bar finishing,) and 4 hammers (one 800-lb., one 1,250-lb., one 2,500-lb., and one 3,500-lb.); crucible steel department, added in 1903, contains one 36-pot crucible steel-melting furnace with an annual capacity of 2,500 tons of ingots; first crucible steel made by the Frankford Steel Company on October 9, 1903; product, hammered and rolled steel bars and sheets for tools, saws, knives, files, etc.; also rerolled Swedish and Norway iron and rerolled and hammered open-hearth steel; annual capacity, 15,000 tons of rolled and hammered products. Fuel, bituminous coal and producer gas. Brand, "J. I." in a circle. John Illingworth, President; Charles P. Soden, Vice President; William H. Illingworth, Secretary; Clarence Illingworth, Treasurer. Selling agents, Stubbs Steel Company, Philadelphia; McMinn & Quigley, Boston. (Formerly operated by the Frankford Steel Company; acquired by the John Illingworth Steel Company December 1, 1904.)
- Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons Iron and Steel Works, Tacony, Philadelphia.—*See page 125.*
- Midvale (The) Steel Company, Nicetown, Philadelphia. This company manufactures crucible and open-hearth steel ingots and castings, hammered car axles, steel gun forgings, forged armor plates, tires, and other forms of rolled and forged finished steel products.—*Company declines to give a detailed description of its plant.*
- Nicotown Plate Washer Company, (not incorporated,) Nicetown, Philadelphia. Built in 1900; first washer plate rolled in 1902; first bars rolled in 1906; 2 scrap heating furnaces, 18 washer machines, and one 10-inch train of rolls; product, iron and steel bars, rounds, flats, and squares; also wrought washers and punched work of all kinds; annual capacity, 12,000 tons of bar iron and 20,000 kegs of washers, 200 pounds to the keg. Fuel, bituminous coal. Wheeler Lord, Proprietor.
- Philadelphia Forge Company, 20 Cliff st., New York. Works at Tacony, Philadelphia. Rolled rounds, squares, etc.; also forged die blocks, shafts, etc.
- Philadelphia Steel and Iron Works, Trenton ave. and Margaret st., Frankford, Philadelphia. Built in 1880 and enlarged in 1895; one 20,000-lb. special furnace for the manufacture of "Eisen" tool steel and castings; tensile strength from 50,000 to 60,000 pounds per square inch; annual capacity, 1,800 tons. One experimental crucible steel-melting furnace with 2 pots built in 1904; first steel made in February, 1904; product, "Eisen" steel castings for tools and general work. Fuel, coal. (Formerly owned and operated by the Philadelphia Steel and Iron Company; later acquired by A. N. Baggs; acquired from Mr. Baggs on May 18,

1907, by the Eisen-Steel Manufacturing Company.)—*Idle. Address the Inventors and Investors Corporation, Philadelphia.*

Standard Roller Bearing Company, Forty-eighth st. and Girard ave., Philadelphia. Works for the manufacture of iron and brass castings built in 1902; crucible steel-melting furnaces added in 1905; first crucible steel made December 14, 1905; plant now contains three 24-pot crucible steel-melting furnaces; product, crucible steel machinery castings for the use of the company only; estimated annual capacity, from 1,500 tons to 2,000 tons. Fuel, oil. The company makes drop forgings for its own use exclusively; 6 hammers from 1,200 lbs. to 3,000 lbs. are in this department. John C. Winston, President; Isaac H. Clothier, Vice President; Samuel S. Eveland, Vice President and General Manager; William M. Baldwin, Assistant Treasurer and Secretary.

Wharton, Jr., (William) & Co., Incorporated, station "D," Twenty-fifth st. and Washington ave., Philadelphia. One 2-gross-ton Tropenas steel converter built in 1901 and first blow made in June, 1901; 4 cupolas; product, steel castings, chiefly consumed by the firm in its switch works; annual capacity, 2,000 tons. Fuel, coke. Also makes gray iron castings; annual capacity, 10,000 tons. Also operates a machine shop. William Selfridge, President; Victor Angerer, Vice President; Richard Ashhurst, Secretary and Treasurer.

Number of rolling mills and steel works in Philadelphia city and county: 12. Of these one makes Tropenas steel, 2 make open-hearth steel, 5 make crucible steel, one makes special steel, and one makes steel by electricity. No blast furnaces.

LEHIGH VALLEY.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Northampton, Lehigh, Carbon, and Bucks Counties.

ANTHRACITE AND MIXED ANTHRACITE AND COKE FURNACES—
27 COMPLETED, 1 PARTLY ERECTED, AND 3 PROJECTED.

Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Works at Allentown. Two stacks, each 65 x 16, built in 1864; open tops; two old-style cast-iron stoves; fuel, anthracite coal; ores, local hematite and New Jersey and New York magnetic; product, foundry and gray forge pig iron; total annual capacity, 24,000 tons. Brand, "A. R. Mills." A gray iron foundry and a machine shop are connected with the furnaces. Herbert M. Howe, President; H. W. Allison, Secretary, Treasurer, and General Manager.—*Both active in 1907.*

Bethlehem Furnaces, Bethlehem Steel Company, South Bethlehem.

Five completed stacks, one stack partly erected, and 3 stacks projected; fuel, anthracite coal and coke. Controlled by the Bethlehem Steel Corporation.—*See page 105.*

Carbon Iron Works, Carbon Iron and Steel Company, Limited, Mauch Chunk. Works at Parryville. One stack, 66 x 15, built in 1869 and blown in in 1870; rebuilt in 1894-5 and 1898; three 65 x 18 Foote brick stoves; fuel, anthracite coal and coke; ores, magnetic from New Jersey and Lake Champlain, Lake Superior, and foreign; product, "Carbon" foundry iron, "Parry" Bessemer iron, and "Viking" low-phosphorus iron; annual capacity, 38,000 tons. M. S. Kemmerer, Chairman, and J. L. Kemmerer, Secretary and Treasurer, Mauch Chunk; S. S. Freeman, Superintendent and Selling Agent, Parryville.—*Active in 1907.*

Crane Furnaces, Crane Iron Works, Catasauqua. Three stacks; fuel, anthracite coal and coke. Controlled by the Empire Steel and Iron Company.—*See pages 127-28.*

Crumwold Furnace Department, Reading Iron Company, Reading. Furnace at Emaus. One stack; fuel, anthracite coal and coke.—*See page 134.*

Durham Iron Company, Riegelsville. One stack, 75 x 16½, built in 1874 and first blown in in February, 1876; six Cooper-Durham iron stoves; fuel, anthracite coal and Connellsville coke; ores, foreign, Lake Superior, local hematite, and New Jersey magnetic; product, foundry, forge, basic open-hearth, and Bessemer pig iron; annual capacity, about 39,000 tons. Brand, "Durham." Julius Christensen, President, and H. E. Beecher, Secretary and Treasurer, 926 Drexel Building, Philadelphia; John Jameson, Vice President, Riegelsville, Pa.—*Last active in 1905. For sale or lease.*

Hokendauqua Furnaces, The Thomas Iron Company, Easton. Furnaces at Hokendauqua. Four stacks; fuel, mixed anthracite coal and coke.—*See page 129.*

Keystone Furnace, The Thomas Iron Company, Easton. Furnace at (Island Park) Easton. One stack; fuel, mixed anthracite coal and coke.—*See page 129.*

Lehigh Iron and Steel Company, Allentown. Two stacks: No. 1, 65 x 16, completed July 22, 1869, and rebuilt in 1886; No. 2, 60 x 15, completed October 21, 1872, and rebuilt in 1888; partly rebuilt in 1907; work suspended; No. 1 has double Player and Durham stoves and No. 2 has fire-brick stoves; fuel, anthracite coal and coke; ores, Lehigh county and Lake Superior hematite and New Jersey magnetic; specialty, high-grade foundry and mill pig iron; total annual capacity, 57,000 tons. Brand, "Lehigh." President, vacant; F. J. Rimmel, Secretary.—*No. 1, last active in 1905, may be dismantled; No. 2 being dismantled.*

Lock Ridge Furnaces, The Thomas Iron Company, Easton. Furnaces at Alburtis. Two anthracite coal stacks.—*See page 129.*

Macungie Furnace, Empire Steel and Iron Company, Catasauqua. Furnace at Macungie. One stack; fuel, anthracite coal and coke.—*See page 128.*

Palmerton Furnaces, The New Jersey Zinc Company (of Pa.), South Bethlehem. Furnaces at Palmerton. Two stacks; fuel, anthracite coal and coke—*See page 120.*

Saucon Furnaces, The Thomas Iron Company, Easton. Furnaces at Hellertown. Two stacks; fuel, mixed anthracite coal and coke.—*See pages 129-30.*

South Bethlehem Furnace, The New Jersey Zinc Company (of Pa.), South Bethlehem. One stack; fuel, anthracite coal and coke.—*See page 120.*

Number of furnaces in the Lehigh Valley: 27 completed, one partly erected, and 3 projected. Of the completed furnaces 23 use anthracite coal and coke mixed and 4 use anthracite coal alone. The partly-erected furnace and the 3 projected furnaces will probably use anthracite coal and coke mixed.

ROLLING MILLS AND STEEL WORKS—8.

Adams Crucible Steel Works, Redington. Built in 1903; one Swindell 5-hole crucible steel-melting furnace; number of pots, 30; first crucible steel made July 12, 1903; 2 steel cementing furnaces and 2 hammers (one 750 and one 1,500-lb.); product, tool steel, castings, etc.; annual capacity, 1,350 tons. Brand, "Redington." Fuel, coal. (Formerly operated by the Adams Crucible Steel Company.)—*Idle and for sale or lease. Address H. H. Adams, Jr., 149 Broadway, New York.*

Allentown Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Allentown.—*See page 43.*

Bethlehem Steel Works, (including open-hearth steel department, rolling mills, forge and armor plate department, and Saucon Plant,) Bethlehem Steel Company, South Bethlehem.—*See pages 105-7.*

Bristol Rolling Mill, Bristol Iron and Steel Company, Real Estate Trust Building, Philadelphia. Works at Bristol. Built in 1875-6; 6 single busheling and 3 heating furnaces and 3 trains of rolls (one 3-high 18-inch muck with coffee mill squeezer and one 8 and one 12-inch finishing); product, bar, band, and scroll iron; annual capacity, single turn, 7,000 tons. Fuel, bituminous coal. Brand, "Bristol." John J. Caine, President, North American Building, and Charles M. Foster, Secretary and Treasurer, Real Estate Trust Building, Philadelphia. Selling agents, Miller, Foster & Co., Real Estate Trust Building, Philadelphia. (Formerly op-

erated by the Consolidated Iron and Steel Company ; acquired by the present owners on January 1, 1908.)

Bryden Horse Shoe Works, Bryden Horse Shoe Company, Catasauqua. Organized in 1882 ; rolling mill department added in 1889-90 and first put in operation in April, 1890 ; 3 coal heating furnaces, one gas heating furnace, and 4 trains of rolls (two 9, one 10, and one 20-inch) ; press and forge departments connected with the works contain 14 heating furnaces, 12 benders, 12 presses, and four 1,200-lb. hammers ; product, "Boss," "Bryden," and "Banner" forged and rolled iron and open-hearth steel horse and mule shoes ; also steel and aluminum racing and trotting plates. Fuel, bituminous and anthracite coal. George E. Holton, President and Treasurer ; T. F. Frederick, Secretary.

Catasauqua Steel Works, Mrs. Emma L. Johnson, Catasauqua. Works at West Catasauqua. Built in 1877 and first put in operation in that year ; one heating furnace, 2 annealing furnaces, one 12-inch train of hot sheet rolls, and 2 trains of 9-inch cold sheet rolls ; product, strip steel from one to six inches wide ; annual capacity, 1,750 tons of hot-rolled and 1,000 tons of cold-rolled strips. Fuel, bituminous coal.—*Idle and for sale or lease.*

Slatington Rolling Mill, Slatington Rolling Mill Company, Slatington. Built in 1890 ; 6 single puddling furnaces, one busheling furnace, 2 heating furnaces, and 3 trains of rolls (10, 16, and 20-inch) ; product, high-grade bar iron made from a special puddled mixture and by a patented process ; also boiler-rivet and staybolt iron, horseshoe and angle iron, carriage drop forging iron, and special shapes rolled to order ; annual capacity, 7,500 tons. Fuel, bituminous coal. Brands, "Slatington," "Slatington D. R.," "Slatington S. B.," "Slatington Special," and "Slatington Norway." Elias German, President ; W. H. Andrews, Secretary ; S. DeLong, Treasurer and General Manager. Selling agent, E. W. Harrison, 107 West Lehigh ave., Philadelphia.

Sterlingworth Railway Supply Company, Easton. Built in 1900 and first put in operation June 1, 1900 ; one heating furnace and one 21-inch train of rolls ; product, deck beams for brake beam sections ; annual capacity, 10,000 tons. Fuel, coal. Also makes air furnace and malleable iron castings. William J. Kuebler, Receiver ; F. W. Coolbaugh, President ; Edward Van Orden, Vice President ; Kenneth Coolbaugh, Secretary ; Clark Cooper, Treasurer ; Charles James, General Manager.—*Train of rolls dismantled late in 1907 ; malleable and air furnace casting departments active.*

Number of rolling mills and steel works in the Lehigh Valley : 8. Of these one makes acid and basic open-hearth steel, 2 make crucible steel, and one can make cemented steel.

SCHUYLKILL VALLEY.

Embraces Furnaces, Rolling Mills, Steel Works, and Bloomaries in Montgomery, Berks, Schuylkill, and in parts of Chester and Lebanon Counties.

COKE AND MIXED ANTHRACITE COAL AND COKE
FURNACES—15.

Brooke Furnaces, The E. and G. Brooke Iron Company, Birdsboro. Two stacks: No. 2, 57 x 15, built in 1871, and No. 3, 66 x 14½, built in 1873; one Roberts, three Durham, and three Whitwell hot-blast stoves; fuel, anthracite coal and coke mixed and occasionally coke; ores, Lake and some Newfoundland and magnetic; product, principally basic open-hearth pig iron; also a little forge pig iron; total annual capacity, 90,000 tons. Brand, "Brooke." No. 3 is equipped with a Gayley dry-air plant. Robert E. Brooke, Manager; Cyrus G. Henry, Superintendent. Selling agents, Pilling & Crane, Girard Building, Philadelphia. (Formerly called the Keystone Furnaces.)—*Both active in 1907. For list of officers see Birdsboro Nail Works, page 266.*

Henry Clay Furnaces, Empire Steel and Iron Company, Catasauqua. Furnaces at Reading. Two stacks; fuel, anthracite coal and coke.—*See page 128.*

Keystone Furnace Department, Reading Iron Company, Reading. One stack; fuel, anthracite coal and coke.—*See page 134.*

Leesport Furnace, Leesport Furnace Company, Leesport. One stack, 58 x 16, built in 1852 and first blown-in in 1853; rebuilt in 1871; two Gordon, Strobel & Laureau stoves; fuel, anthracite coal and coke; ores, local hematite and magnetic; product, foundry and forge pig iron; specialty, foundry pig iron; annual capacity, 18,000 tons. Brand, "Leesport." P. W. Kiefaber, President, and O. A. Keim, Secretary and Treasurer. Selling agents, J. J. Mohr & Son, Bullitt Building, Philadelphia.—*Active in 1907.*

Robesonia Furnace, The Robesonia Iron Company, Limited, Robesonia. One stack, 80 x 18, built in 1855, enlarged in 1873, and rebuilt in 1885; one Massicks & Crooke stove, 85 x 18, two Roberts stoves, each 90 x 18, and two Whitwell stoves, each 60 x 18; fuel, anthracite coal and coke; ore, Cornwall exclusively, mined by the company; product, low-phosphorus pig iron; annual capacity, 50,000 tons. Brand, "Robesonia." A small machine repair shop for the use of the company is connected with the furnace. William R. White, Chairman, 1016 Stephen Girard Building, Philadelphia; Howard C. Shirk, Secretary, Lebanon; S. B. Patterson, Superintendent, Robesonia. Selling agents, J. Tattall Lea & Co., 1016 Stephen Girard Building, Philadelphia.—*Active in 1907.*

Sheridan Furnace No. 2, Berkshire Iron Works, Sheridan. One stack, 75 x 16, built in 1874-5 and rebuilt in 1891; three fire-brick stoves (two Ford & Moncur, each 60 x 20, and one Roberts, 80 x 20); fuel, anthracite coal and coke; ore, Cornwall local hematite; product, foundry pig iron; annual capacity, 43,000 tons. Brand, "Sheridan." J. Mitchell Clark, President; J. Armstrong Rawlins, Vice President; Walter T. Stern, Secretary and Treasurer; S. H. Chauvenet, General Manager. Selling agents, Naylor & Co., 45 Wall st., New York. (No. 1 Furnace, built in 1862, practically dismantled in 1905-6. Formerly operated by the Pennsylvania Furnace Company; acquired by the Berkshire Iron Works in December, 1904.)—*Active in 1907.*

Swede Furnaces, Richard Heckscher and Sons Company, Swedeland; general offices, Manhattan Building, Philadelphia. Two stacks: No. 1, 80 x 18, built in 1850 and rebuilt in 1881, 1887, 1897, 1899, and 1905; No. 2, 85 x 16½, built in 1890-1, enlarged in 1899, and rebuilt in 1905; No. 1 has three F. C. Roberts & Co. fire-brick stoves, each 80 x 20, and No. 2 has three Taws & Hartman regenerative stoves, each 70 x 18, and two F. C. Roberts & Co. fire-brick stoves, each 100 x 21; both furnaces were equipped with skip hoists and electric ore-handling machinery in 1905; fuel, coke; ores, Lake Superior and highest grades of foreign; product, standard neutral mill, foundry, malleable, Bessemer, and basic open-hearth pig iron; annual capacity: No. 1, 145,000 tons; No. 2, 90,000 tons: total, 235,000 tons. Brand, "Swede." Equipped with two Uehling pig-iron casting machines and conveyors; also a machine repair shop. Austin Heckscher, President; Gustave A. Heckscher, Vice President; Herbert W. Gwyn, Secretary; Ledyard Heckscher, Treasurer and General Manager; George M. Black, Superintendent. Selling agents for New York and New England only, Nash, Isham & Co., New York.—*Both active in 1907.*

Temple Furnace, Temple Iron Company, Reading. Furnace at Temple. One stack, 75 x 15, built in 1867 and rebuilt in 1875; three McClure 3-pass hot-blast stoves, each 70 x 18; fuel, anthracite coal and coke; ores, Lake Superior, local hematite, New Jersey magnetic, and occasionally foreign; product, foundry and forge pig iron; annual capacity, 35,000 tons. Brand, "Temple." George F. Baer, President, Albert Broden, Manager, and George B. Connard, Assistant Treasurer, Reading; A. F. Law, Vice President and Treasurer, and George L. Houser, Secretary, Scranton.—*Active in 1907.*

Topton Furnace, Empire Steel and Iron Company, Catasauqua. Furnace at Topton. One stack; fuel, anthracite coal and coke.—*See page 128.*

Warwick Furnaces, Warwick Iron and Steel Company, Pottstown; Philadelphia offices, 619 Girard Trust Building. Three stacks at Pottstown, two owned and one leased. Nos. 1 and 2, (owned,) two stacks: one, 70 x 16, built in 1875 and blown in in April, 1876; enlarged to present size in 1889; four Kennedy fire-brick stoves, three 60 x 20 and one 80 x 20; and one stack, 100 x 22, built in 1900-1 and first blown in October 8, 1901; four Cowper-Roberts stoves, each 100 x 21. No. 3, (formerly called Anvil Furnace,) leased from the Pottstown Iron Company: one stack, 80 x 17, built in 1867 and blown in in December, 1867; remodeled in 1889; overhauled and blown in on December 14, 1906; three fire-brick stoves, each 76½ x 19. Fuel, coke alone and anthracite coal and coke mixed; ores, New Jersey and New York magnetites and Lake Superior; product, foundry, neutral mill, and basic pig iron; annual capacity, 275,000 tons. Brand, "Warwick." Nos. 1 and 2 are equipped with one single and two double-strand Uehling pig-iron casting machines and a Gayley dry-air plant. Edgar S. Cook, President and General Manager; Edgar M. Fridy, Secretary; Edward Bailey Cook, Manager; H. F. Hallman, Assistant Treasurer. Selling agents: for mill iron exclusively without regard to territory, Pullman & Stevens, 238 South Third st., Philadelphia; for foundry and basic iron, Pilling & Crane, Girard Building, Philadelphia; for foundry iron in New York and New England, J. Brooks Fenno & Co., Boston.—*All active in 1907.*

Number of furnaces in the Schuylkill Valley: 15. Of these 9 use anthracite coal and coke mixed, 2 use anthracite coal and coke mixed and occasionally coke alone, and 4 as a rule use coke alone.

BLOOMARIES—2.

Exeter Steam Forge, H. C. Seidel, Lorane. Built in 1868, burned in 1894, rebuilt in the same year, and operations resumed January 1, 1895; one heating furnace and one 2,000-lb. hammer; product, bars and forgings made from charcoal blooms and wrought-iron scrap; also billets from No. 1 wrought scrap; annual capacity, 500 tons. Fuel, bituminous coal.

Spring City Bloom Works, Real Estate Trust Building, Philadelphia. Works at Spring City. Built in 1884; destroyed by fire in February, 1907; immediately rebuilt and operations resumed April 13, 1907; 8 forge fires and one hammer; product, charcoal iron blooms, billets, and slabs for boiler tubes and sheets made from iron and steel scrap; daily capacity, 16 tons. Fuel, charcoal. Brand, "S. C." in a circle. E. B. Leaf, President; G. H. Leaf, Secretary and Treasurer. Selling agents, E. B. Leaf & Co., Real Estate Trust Building, Philadelphia.

Number of bloomaries in the Schuylkill Valley which make billets, blooms, bars, forgings, etc., from iron and steel scrap for sale: 2.

ROLLING MILLS AND STEEL WORKS—29.

Birdsboro Nail Works, The E. and G. Brooke Iron Company, Birdsboro. Built in 1848; 16 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (two 3-high 20-inch muck and one 24-inch skelp and nail plate,) and 118 cut-nail machines; steam and water power; product, nails, muck bar, and skelp; annual capacity, 250,000 kegs of cut nails and 16,500 tons of muck bar and skelp. Fuel, bituminous coal. Brand, "Anchor." Bessemer steel department contains 2 small tilting converters; first blow made September 21, 1885; idle; annual capacity, 18,000 tons of ingots. Edward Brooke, President; George Brooke, Jr., Secretary; Robert E. Brooke, Treasurer. Selling agents, C. J. Stebbins, 103 Reade st., and Patterson Brothers, 27 Park Row, New York; for New England, F. M. Trafton, 176 Federal st., Boston.—*See Brooke Furnaces, page 263.*

Birdsboro Steel Foundry and Machine Company, Birdsboro. Built in 1901-3; 2 acid open-hearth steel furnaces (one 20 and one 25-gross-ton); first steel made in March, 1903; product, steel castings for locomotives, ships, rolling mills, bridges, electrical machinery, etc.; annual capacity, 25,000 tons. Fuel, producer gas. Gray iron and air furnace castings are also made; annual capacity, 12,500 tons. Also does a general foundry and machine business. George Brooke, President; Robert E. Brooke, Vice President; D. Owen Brooke, Secretary and Treasurer; Leon E. Thomas, Manager. (Formerly operated under the name of the Diamond Drill and Machine Company; name changed to Birdsboro Steel Foundry and Machine Company on April 13, 1905.)

Blandon Rolling Mill, Estate of Simon Seyfert, Blandon. Built in 1867 and enlarged and improved in 1880, 1887, 1890, 1891, and 1892; one single puddling furnace, 6 double puddling furnaces, 4 heating furnaces, one rotary squeezer, and 3 trains of rolls (one muck and one 8 and one 11-inch finishing); product, grooved pipe skelp; annual capacity, 20,000 tons. Fuel, bituminous coal.—*See Gibraltar Iron Works, page 268.*

Carpenter (The) Steel Company, Reading. Experimental plant of 8 crucible steel-melting holes built at Reading, Pa., in 1889 on leased property; first steel made in July, 1889; removed to present site in 1889-90 and works destroyed by fire on December 26, 1891; rebuilt and put in operation in 1892; 40 heating, welding, and annealing furnaces, 5 trains of hot rolls, (one 8, two 10, and two 16-inch,) 8 trains of cold rolls, (six 8, one 10, and one 12-inch,)

9 hammers, (one 600-lb., one 750-lb., two 1,000-lb., one 1,500-lb., one 1,800-lb., one 2,500-lb., one 3,500-lb., and one 7½-ton,) and four 30-pot gas-fired crucible steel-melting furnaces; product, crucible steel for tools, dies, cutlery, files, wire, etc., and crucible chrome-nickel steel for automobile parts; annual capacity, 9,000 tons of crucible steel ingots and 35,000 tons of rolled and forged products. Fuel, bituminous coal. The company also operates a machine shop and a cold-rolling and wire-drawing plant. Robert E. Jennings, President; W. B. Kunhardt, Treasurer; J. E. Sullivan, General Sales Agent. Selling agencies, 100 Broadway, New York, and 1304 West Sixth st., Cleveland.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken; branch offices, Boston, New York, and Chicago. Built in 1832, 1852, and 1864 respectively; rebuilt in 1882-3; 2 double puddling furnaces, 7 heating furnaces, and 8 trains of rolls (one 3-high 72-inch, one 3-high 60-inch, one 2-high 57-inch, one 2-high 44-inch, and two 2-high 40-inch sheet and two 2-high 22-inch bar); steam and water power; product, all kinds of sheet, flue, and plate iron; corrugated iron a specialty; annual capacity, 20,000 tons. Fuel, bituminous coal and coke. Brands, "Blue Annealed" iron and steel, "Hope," "Anchor," "R. G.," "Special Electric," "Best Bloom," and "Soft Steel." A machine shop for the exclusive use of the company is connected with the works. Charles M. Wood, President; James W. Wood, Vice President and General Manager; William M. Wood, Secretary and Treasurer. Selling agent, A. C. Jessup, 120 Liberty st., New York.

Delaware Seamless Tube Company, Auburn. Rolling mill for the manufacture of blanks for seamless tubes added to a bolt and nut plant in 1897 and first blanks rolled in that year; rebuilt in 1902 and put in operation in January, 1903; 2 direct-fired heating furnaces and 2 trains of rolls (10 and 14-inch); product, hollow seamless billets, boiler tubes, hollow staybolt stock, and mechanical seamless tubing rolled from solid purchased billets; annual capacity, 6,000 tons of hollow billets and 5,000 tons of boiler tubes. Fuel, anthracite and bituminous coal. Brand, "Delaware." H. T. Wallace, President; Daniel J. Driscoll, Vice President, Treasurer, and Manager; John R. Morrison, Secretary.

Douglassville (The) Iron Company, Limited, Douglassville. Built as a forge in 1878; rolling mill added in 1887 and enlarged in 1890; 6 double puddling furnaces, one rotary squeezer, and one train of rolls; product, muck bar; annual capacity, 7,000 tons. Fuel, bituminous coal. D. K. Flannery, President and Manager; F. R. Gerhart, Secretary; John H. Egolf, Treasurer.—*Idle; last active in 1905. For sale or lease. Address the Secretary.*

Eastern (The) Steel Company, Pottsville; branch offices, No. 71 Broadway, New York; Pennsylvania Building, Philadelphia; 110 State st., Boston. Original mill built to make rails in 1852; rebuilt and altered to make shapes in 1877; acquired by the Eastern Steel Company in 1902, which practically dismantled and rebuilt the works; now equipped with 3 soaking pits, one 44-inch blooming mill, and one 12-inch, one 19-inch, and one 28-inch structural mill; product, blooms and billets both for the company's use and for sale; also steel beams, channels, angles, tees, bars, and shafting; first products rolled by the Eastern Steel Company on July 17, 1905; annual capacity, 125,000 tons of blooms and billets and from 180,000 tons to 190,000 tons of finished rolled material. Open-hearth steel plant originally built in 1890 and first steel made in August, 1890; rebuilt and enlarged in 1902-4; now equipped with four 50-gross-ton basic furnaces; first steel made by the present owners July 22, 1905; product, ingots; annual capacity, 125,000 tons. Fuel, producer gas. A bridge shop with an annual capacity of 7,500 tons is connected with the works. Veryl Preston, President; James A. Burden, Jr., First Vice President; August Heckscher, Second Vice President; Edward L. Herndon, Secretary and Treasurer. Selling agents, A. M. Castle & Co., Chicago; Standard Iron and Steel Company, Cleveland.

Ellwood Ivins' Tube Works, Ellwood Ivins, proprietor, 487 Broadway, New York. Works at Oak Lane Station, Pa. Built in 1893 and first put in operation in 1894; 4 forge fires, 3 heating furnaces, and 2 trains of 21-inch rolls; product, blanks consumed by the works in the manufacture of seamless-drawn tubes; specialty, small sizes of seamless-drawn steel tubes; also tool steel tubes; annual capacity, 500 tons of blanks and 2,000,000 feet of steel tubes. Fuel, bituminous coal. Selling agent, George I. Cook, 487 Broadway, New York.

Gibraltar Iron Works, Estate of Simon Seyfert, Reading. Built in 1846 and rebuilt in 1883-4; 4 heating furnaces and 2 trains of 19-inch rolls (one bar and one plate); product, boiler plate and boiler tube and pipe iron; annual capacity, 5,300 tons. A forge connected with the works was rebuilt in 1846 and again in 1891; it has 8 charcoal forge fires and one 4-ton steam hammer; product, charcoal blooms, all consumed in the rolling mill; annual capacity, 5,000 tons. Fuel, bituminous coal.—*See Blandon Rolling Mill, page 266.*

Glasgow Iron and Steel Works, (owned,) Glasgow Iron Company, Pottstown.—*See page 133.*

Glendale Mill, Lucknow Iron and Steel Company, lessee, Harris-

burg. Works at Pine Iron Works post office; telegraph address, Manatawny Station.—*See page 115.*

Hoopes and Townsend Company, post-office station "S," Philadelphia. Bolt, nut, and rivet works at 1330 Buttonwood st., Philadelphia. Rolling mills at Hoopeston, Pa., built in 1901 and first put in operation on October 16, 1901; 2 puddling furnaces, 6 heating furnaces, 7 busheling furnaces, and 3 trains of rolls (9, 12, and 20-inch); product, bar iron and steel, consumed by the company in the manufacture of cold-punched nuts, bolts, washers, rods and irons for bridges and buildings, and boiler, structural, ship, and tank rivets; annual capacity, about 25,000 tons of bars. Fuel, bituminous coal. Clement R. Hoopes, President; Barton Hoopes, Jr., Vice President; James M. Hibbs, Secretary; John M. Zook, Treasurer; Albert B. Marks, Assistant Secretary; Mac-Millan Hoopes, Manager.

Ivy Rock Steel Works, Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia. Works at Ivy Rock.—*See pages 130-31.*

Keystone Nail Works, George B. Lessig Company, Incorporated, Pottstown. Built in 1884-5; rebuilt in 1894; 22 double puddling furnaces, 2 regenerative gas heating furnaces, one 9-inch and four 22-inch trains of rolls, and 105 cut-nail machines; product, muck bar, shovel, tack, and nail plate, and "Keystone" iron and steel cut nails; annual capacity, 30,000 tons of muck bar, 14,500 tons of tack, nail, and shovel plate, and 300,000 kegs of cut nails. Fuel, bituminous coal. Louis C. Lessig, President and General Manager; J. B. Lessig, Secretary and Treasurer. (Formerly operated by the Ellis and Lessig Steel and Iron Company; acquired by the George B. Lessig Company, Incorporated, on January 1, 1905.)

Longmead Iron Company, Conshohocken; Philadelphia offices, 468 Drexel Building. Built in 1882 and put in operation in November, 1882; plant enlarged in 1894 and 1906; 16 double puddling furnaces, one gas producer, 2 gas heating furnaces, and 4 trains of rolls (two 20-inch muck and one 12 and one 16-inch skelp); product, muck bar and grooved skelp iron; annual capacity, 25,000 tons of muck bar or 22,000 tons of skelp iron. A plant for the manufacture of wrought-iron pipe, with an annual capacity of 22,000 tons, is connected with the works; also a plant for galvanizing iron and steel products. Fuel, manufactured gas and bituminous and anthracite coal. A machine shop for the use of the company is connected with the works. Jawood Lukens, President and Treasurer; Lewis N. Lukens, Vice President; Thomas C. Yocom, Secretary and General Superintendent. Selling agent, Lewis N. Lukens, 468 Drexel Building, Philadelphia. (Formerly called the Longmead Iron Works.)

Ninth Street Mills Department, Reading Iron Company, Reading.

—See page 135.

Oley Street Mills Department, Reading Iron Company, Reading.—

See page 135.

Pencoyd Iron Works, American Bridge Company, Pittsburgh, Pa.

Works at Pencoyd.—See page 66.

Phoenix Iron Works, The Phoenix Iron Company, 410 Walnut st.,

Philadelphia. Works at Phoenixville.—See page 132.

Pottsgrove Iron Works, Potts Brothers Iron Company, Limited,

Pottstown. Built in 1846; 8 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls (one muck and one plate); product, muck bar, boiler plate, and tank, flue, and pipe iron; annual capacity, 10,000 tons of muck bar and 12,000 tons of plate iron. Specialties, pipe and flue iron. Fuel, bituminous coal. George H. Potts, Chairman; H. C. Hitner, Treasurer; H. Leonard Potts, Secretary.

Pottstown Iron Works, (leased,) Glasgow Iron Company, Pottstown.—See pages 133-34.

Pottstown Works, Stanley G. Flagg & Co.; general offices, 424 North Nineteenth st., Philadelphia. Works at Pottstown. Built in

1895; 5 cupolas, 7 annealing furnaces, and one 16-gross-ton acid open-hearth steel furnace, the latter added in 1899; product, gray iron and malleable iron castings and pipe fittings but steel castings can be made; annual capacity, from 6,000 tons to 8,000 tons. Fuel, producer gas. The company also operates a plant in Philadelphia, known as the Union Works; product, "Flagg" steel castings made in an air furnace and malleable iron castings.

Reading Steel Casting Company, Reading; New York offices, West

Street Building. Built in 1901 and first blow made May 1, 1901; plant now contains two 2-gross-ton Tropenas steel converters and 2 cupolas; product, steel castings; annual capacity, 3,000 tons. Fuel, bituminous and anthracite coal and coke. W. D. Sargent, President, and D. W. Yeckley, Secretary and Treasurer, New York; J. Turner Moore, Vice President and General Manager, Reading. (Formerly operated by the Brylgon Steel Casting Company; operated under lease by the Reading Steel Casting Company; purchased by the same company on June 1, 1907.)

Reading Works, American Iron and Steel Manufacturing Company, Lebanon. Works at Reading.—See page 137.

Schuylkill Haven Iron and Steel Company, Schuylkill Haven;

Philadelphia offices, Arcade Building. Put in operation October 1, 1873; one puddling, 2 bar heating, 2 pile, and 2 busheling furnaces and 3 trains of rolls (one 16-inch muck and one 10 and one 16-inch bar finishing); product, round and square bars from $\frac{1}{2}$ of

an inch to 2 inches and flats from 1 inch by $\frac{1}{4}$ of an inch to 3 inches by $\frac{3}{4}$ of an inch; annual capacity, 7,000 tons of iron bars and 5,000 tons of steel bars. Fuel, coal. Emanuel Dreifus, President, and Henry P. Rees, Treasurer, Philadelphia; John W. Russel, Vice President and Secretary, Schuylkill Haven. Selling agents, A. M. Wood Company, Arcade Building, Philadelphia. (Formerly called the Schuylkill Haven Rolling Mill and owned and operated by F. H. Clement & Co.; acquired by the Schuylkill Haven Iron and Steel Company on March 1, 1907.)

Schuylkill Iron Works, Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia. Works at Conshohocken.—*See page 131.*

Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading. Works at Seyfert Station, W. & N. R. R. Built in 1880-1 and started in March, 1881; 9 double puddling furnaces, 4 heating furnaces, one 4-ton hammer, one rotary squeezer, and 2 trains of rolls (one 22-inch puddle with 2 stands and one 22 x 66-inch plate or skelp); product, boiler-tube skelp, pipe skelp, and puddled bars; annual capacity, 15,000 tons of skelp iron and 10,000 tons of puddled bars. Fuel, bituminous coal. Brand, "Seyfert."—*Puddling department active in 1907; plate or skelp mill idle.*

Sheet Mill Department, Reading Iron Company.—*See page 135.*

Number of rolling mills and steel works in the Schuylkill Valley: 29. Of these 2 have idle Bessemer plants, one makes Tropenas steel, 6 have open-hearth plants, and one makes crucible steel.

EASTERN PENNSYLVANIA DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Delaware County and in a part of Chester County.

COKE FURNACES—1.

Tidewater Furnace, The Pennsylvania Steel Company, lessee, Girard Building, Philadelphia. Furnace at Thurlow Station, below Chester. One stack; fuel, by-product coke.—*See page 145.*

Number of coke furnaces in the Eastern Pennsylvania District: one.

CHARCOAL AND MISCELLANEOUS FURNACES.

Isabella Furnace, William M. Potts, Wyebrooke. One stack, 60 x 7 $\frac{1}{2}$, built in 1835 and rebuilt in 1864, 1881, and 1886; cold blast; fuel, charcoal; product, car-wheel pig iron made from magnetic and hematite ores mined in Lancaster and Chester counties and a mixture of foreign and Lake Superior ores; annual capacity, 5,400 tons. Brand, "Wyebrooke."—*Idle since 1894. For lease.*

Primos Chemical Company, Primos, Delaware county. Built in 1899; first put in operation February 11, 1899; thirty-seven 4-pot crucible melting furnaces, 3 continuous melting furnaces, 7 reverber-

actory furnaces, and one electric furnace; fuel, coal, coke, and producer gas; product, steel alloys and metals, tungsten, vanadium, molybdenum, ferro-silicon, ferro-chrome, etc.; annual capacity, 500 tons of tungsten, 95 tons of ferro-silicon, 115 tons of ferro-chrome, 15 tons of molybdenum, 5 tons of vanadium, etc. Walter M. Stein, President; Gideon Boericke, Secretary and Treasurer; August Stein, Superintendent.—*Active in 1907.*

Number of charcoal furnaces in Eastern Pennsylvania: one.

Number of coke and charcoal furnaces in the Eastern Pennsylvania District: 2 stacks. Of these one uses coke and one uses charcoal. In addition one plant makes steel alloys and metals, tungsten, vanadium, molybdenum, ferro-silicon, ferro-chrome, etc.

ROLLING MILLS AND STEEL WORKS—16.

Brandywine Rolling Mills, Worth Brothers Company, Coatesville.—*See pages 141-42.*

Chester Steel Castings Company, 407 Sansom st., Philadelphia. Works at Chester. Built in 1871; one 20-gross-ton acid open-hearth steel furnace erected in 1893 and first steel made in May, 1893; one 30-gross-ton acid open-hearth furnace added in 1899; 5 gas producers; product, steel castings of every description from 1 to 40,000 lbs.; also has 7 furnaces for producing castings by the McHaffie process; annual capacity, single turn, 6,250 tons of open-hearth and 1,100 tons of McHaffie steel castings. Fuel, coal. E. Waterman Dwight, President and Treasurer; William T. Dunning, Secretary; A. F. S. Blackwood, Superintendent. Selling agents, A. P. Witteman & Co., 1223-25 Spring st., Philadelphia, and 10 Oliver st., Boston.

Crucible Steel Casting Company, Lansdowne. Built in 1905; four 8-pot crucible steel-melting furnaces; 32 pots can be used at a heat; first steel made July 25, 1905; product, all kinds of steel castings; annual capacity, 1,000 tons. Fuel, oil. J. N. M. Shimer, President; C. R. H. Cunningham, Vice President and Treasurer; H. Bloodsworth, Secretary.

Duplex Metals Company, 208 Fifth avenue, New York. Works at Chester, Pa. Built in 1880; 8 heating furnaces, 7 crucible furnaces, one annealing furnace, 6 trains of hot rolls, (one 3-high 12-inch guide, one 18-inch, (idle,) one 3-high 23-inch slab, one 24 x 44-inch sheet, and one 9 and one 10-inch for rolling No. 5 rods,) and one 24 x 72-inch cold sheet mill; the crucible furnaces are used for melting cupreous metals, aluminum, silver, etc.; product, copper-clad steel, bronze steel, aluminum steel, and silver steel in plates, sheets, tubes, and wire made by the Monnot process; annual capacity, 15,000 tons of rods and 15,000

tons of other rolled products. Fuel, bituminous coal and oil. J. F. Monnot, President; William C. Hawkins, Vice President; Byron E. Eldred, Secretary and Treasurer. (Formerly owned by the Combination Steel and Iron Company; acquired by the Duplex Metals Company on November 1, 1906.)

Federal Steel Foundry Company, Chester. Built in 1903-4; two 25-gross-ton acid open-hearth steel furnaces and one annealing furnace; first open-hearth steel made June 27, 1904; product, steel castings for machinery, engines, electrical work, locomotives, ships, etc.; annual capacity, 18,000 tons. Fuel, manufactured gas. J. W. Booth, President, and H. C. Booth, Secretary, Chester; E. C. Miller, Vice President, and William Grange, Treasurer, Philadelphia. (Formerly operated by the Delaware River Steel Casting Company; acquired by the present owners on June 1, 1906.)

Keystone Steel Casting Company, Chester. Construction commenced in April, 1907; completed and put in operation in July, 1907; two 4 and two 8-pot crucible steel-melting furnaces, 5 McHaffie furnaces, and 5 annealing furnaces; 24 crucible pots can be used at a heat; first McHaffie steel made July 25, 1907, and first crucible steel July 29, 1907; product, steel castings from 1 lb. to 1,000 lbs.; annual capacity, 1,200 tons of crucible and 900 tons of McHaffie steel castings. Fuel, oil. A. G. Lorenz, President and General Manager; John J. Buckley, Vice President; David Coulter, Secretary and Treasurer.

Lukens Iron and Steel Works, Lukens Iron and Steel Company, Coatesville.—*See pages 139-40.*

Parkesburg Iron Works, The Parkesburg Iron Company, Parkesburg. First started in April, 1873; enlarged in 1887 and 1889; 2 double puddling furnaces, 15 heating furnaces, two 20-inch trains of 3-high muck rolls, four 2-high plate trains, (three 23 x 50 and one 23 x 60-inch,) 4 hammers, and 2 washer machines; product, boiler-tube skelp iron and stamped washers from $\frac{1}{4}$ of an inch to $2\frac{1}{4}$ inches in diameter; annual capacity, 22,000 tons. A forge connected with the works contains 26 charcoal refinery fires and has an annual capacity of 20,000 tons of charcoal blooms, all consumed in the rolling mill in the manufacture of boiler-tube skelp iron. Fuel, charcoal in the forge and bituminous coal in the rolling mill. Brands, "B," "D," "CB," "MM," "OS," and "Special." A machine shop for the use of the company only is connected with the works. Horace A. Beale, Jr., President; A. J. Williams, Vice President; W. C. Michener, Secretary; E. H. Brodhead, Treasurer and General Manager.

Penn Steel Casting and Machine Company, Front and Penn sts., Chester. Built in 1892 and first open-hearth steel made Septem-

- ber 25, 1892; three 30-gross-ton acid open-hearth steel furnaces and 2 annealing furnaces; two 2-gross-ton Tropenas steel converters, with one cupola, added in 1906-7; first blow made May 8, 1907; product, steel castings; annual capacity, single turn, 14,000 tons of open-hearth and 1,500 tons of Tropenas castings. Also makes cast-steel pipe. Fuel, manufactured gas and coke. A machine shop for custom work is connected with the plant. M. H. Bickley, President; George M. Booth, Secretary and Treasurer.
- Seaboard Steel Casting Company, foot of Jeffrey st., Delaware river, Chester. Built in 1900 and first steel made December 29, 1900; one 25 and two 20-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 25,000 tons. Fuel, manufactured gas. William C. Sproul, President; Joseph W. Cochran, Secretary and Treasurer; D. G. Stokes, Comptroller.
- Solid Steel Casting Company, Chester. Works at Lamokin, one mile south of Chester. Built in 1877 by the Eureka Cast Steel Company; open-hearth steel plant added in 1891 and first steel made June 25, 1891; partly destroyed by fire on August 8, 1893; rebuilt in the same year and put in operation December 2, 1893, a machine shop being added; acquired from the Eureka Cast Steel Company by the Solid Steel Casting Company in 1899; extensive additions and alterations made and plant started in May, 1899; two 20-gross-ton acid open-hearth furnaces, 3 coal-fired annealing furnaces, and 8 mould drying ovens; specialties, all forms of locomotive and machinery castings; annual capacity, 10,000 tons. Fuel, manufactured gas. Felton Bent, President; C. S. Griswold, Secretary and Treasurer; W. H. Worri-
low, Sales Agent. Selling agent, James W. Sederquist, 8 Oliver st., Boston.
- Thurlow Works, American Steel Foundries, Chicago. Works at Thurlow, Pa.—*See page 127.*
- Tidewater Steel Company, Chester. Works at Thurlow Station. Built in 1874-5; 7 gas heating furnaces, two 4-hole soaking pits, and 3 trains of rolls (one 32-inch blooming, one 3-high plate mill with rolls 31 x 112 inches, and one 3-high plate mill with finishing rolls 25 x 72 inches in combination with 25 x 72-inch roughing rolls); product, blooms, slabs, billets, skelp, and fire-box, boiler, ship, and tank plates; annual capacity, 120,000 tons of blooms, billets, and slabs or 70,000 tons of plates. Open-hearth steel department added in 1881-2; five basic open-hearth steel furnaces (three 50 and two 60-gross-ton); annual capacity, 125,000 tons of ingots. Fuel, manufactured gas. Brand, "Tidewater." C. E. Stafford, President; Frank Dreizler, Secretary and Treasurer.—*Idle for several years and for sale or lease. Address F. J.*

Lisman, 30 Broad street, New York, or George McCall, North American Building, Philadelphia. Owns Tidewater Furnace.—See page 145.

Valley Iron Works, Worth Brothers Company, Coatesville.—*Page 142.*

Viaduct Iron Works, Worth Brothers Company, Coatesville. Operated by the Coatesville Rolling Mill Company.—*See page 142.*

Vulcan Charcoal Iron and Steel Company, Crum Lynne. Works at Eddystone Station. Built in 1887-8 and enlarged in 1900; destroyed by fire in March, 1901, and rebuilt in the same year; 2 single and 2 double puddling furnaces, 6 heating furnaces, one rotary squeezer, and 3 trains of rolls (one 3-high 18-inch muck and two 2-high 24 x 60-inch plate); product, tinplate bars and skelp iron for boiler tubes; annual capacity, 24,000 tons. A forge connected with the works contains 12 charcoal refinery fires and one 1½-ton steam hammer; annual capacity, 7,500 tons of blooms, all consumed by the company. Will install Hudson's patent process for manufacturing refined charcoal iron. Fuel, bituminous coal in the rolling mill and charcoal in the forge. George W. B. Fletcher, President and Treasurer; Walter E. Graham, Vice President; Clark Cooper, Secretary; J. Jones Hudson, General Manager. (Formerly operated by the Crum Lynne Iron and Steel Company; acquired by the present company on September 19, 1907.)

Number of rolling mills and steel works in the Eastern Pennsylvania District: 16. Of these one makes Tropenas steel, 9 make open-hearth steel, 2 make crucible steel, and 2 make McHaffie steel.

UPPER SUSQUEHANNA VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Bloomaries in Lackawanna, Montour, Columbia, Northumberland, Union, Luzerne, and Lycoming Counties; also in a part of Perry County.

CHARCOAL FURNACES—1.

Glen Iron Furnace, John T. Church, lessee, Glen Iron. One stack, 35 x 8, built in 1827; abandoned in 1856; revived in July, 1880; again abandoned; again revived and blown in May 12, 1902; fuel, charcoal; ores, local fossiliferous and hematite partly mined by the company; product, cold-blast pig iron; annual capacity, 2,500 tons. Brands, "Glen Iron" for metal containing below 0.70 per cent. of phosphorus and "Berlin" for metal containing 0.70 per cent. and over of phosphorus. (Owned by the Estate of Thomas Scattergood, Philadelphia; formerly operated by the Glen Iron Furnace Company; leased by John T. Church on January 1, 1908.)—*Active in 1907.*

Number of charcoal furnaces in the Upper Susquehanna Valley: one.

BLOOMARIES—1.

Perry Forge, Seidel Brothers, Marysville. Built in 1862, abandoned in 1889, and revived in 1899; 7 forge fires and one hammer; steam power; product, charcoal blooms, billets, and slabs for boiler tubes made from iron and steel scrap; annual capacity, single turn, 1,700 tons. Fuel, charcoal. Brand, "Perry." Sales made by the firm. Charcoal pits with an annual capacity of about 60,000 bushels are also operated. All the charcoal made is consumed by the forge.

Number of bloomaries in the Upper Susquehanna Valley which make charcoal blooms, billets, slabs, etc., for sale: one.

ROLLING MILLS AND STEEL WORKS—15.

Danville Puddle Mill Department, Reading Iron Company, Reading. Works at Danville. (Formerly operated by the Danville Rolling Mill Company.)—*See page 185.*

Danville Structural Tubing Company, (a copartnership,) Danville. Built in 1847 and rebuilt since; 9 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 19-inch puddle and breaking-down train and two 16-inch skelp, the latter equipped with patent tube-making machines); product, muck bar, structural tubing, and shapes for agricultural implements, bedsteads, brake beams, trolley post brackets, railings, fence posts, etc.; annual capacity, 12,000 tons of muck bar and 12,000 tons of other products. Fuel, coal. The structural tubing consists of round unwelded tubing from $\frac{1}{2}$ of an inch to 2 inches in diameter. T. J. Price, General Manager, and S. C. Rebman, Sales Agent. (The puddling furnaces and the 19-inch puddle mill are now operated by Howe & Samuel under lease.)

Duncannon Iron Works, The Duncannon Iron Company, Duncannon; offices, 122 Race st., Philadelphia. Built in 1836; partly destroyed by fire in February, 1904; immediately rebuilt; 44 puddling furnaces, 9 heating furnaces, 6 trains of rolls, (two 18-inch puddle and one 8, one 12, one 16, and one 20-inch finishing,) and 50 cut-nail machines; product, bar iron and iron and steel cut nails; annual capacity, 20,000 tons of bar iron and 125,000 kegs of nails. Fuel, bituminous coal. Brand, "Duncannon." A foundry and machine shop are connected with the works. P. F. Duncan, President; William L. Coover, Secretary; George Pennell, Treasurer and General Manager. Selling agents, Fuller Brothers & Co., 139 Greenwich st., New York.

Jackson and Woodin Works, American Car and Foundry Company, St. Louis, Mo. Works at Berwick, Pa.—*See page 220.*

Kemmerer Iron and Steel Company, Scranton. Construction com-

- menced April 1, 1906; completed and put in operation April 9, 1907; 3 double puddling furnaces, 2 bar heating furnaces, one 300-lb. ball squeezer, and 3 trains of rolls (one 18-inch puddle, one 16-inch roughing, and one 12-inch finishing); product, merchant bar iron and steel; annual capacity, 20,000 tons. Fuel, bituminous coal. Brand, the letter "K" inclosed in a square. H. J. Spruks, President; S. S. Spruks, Vice President; Philip Robinson, Treasurer; George D. Taylor, Secretary. Selling agents, Bittenbender & Co., Scranton.
- Milton (The) Manufacturing Company, Milton. Built in 1886-7; first put in full operation in February, 1889; 10 double puddling furnaces, 5 heating furnaces, one steam hammer, and 5 trains of rolls (one 3-high 20-inch puddle and two 10 and two 16-inch finishing); product, muck bar and bar iron; annual capacity, about 20,000 tons of muck bar and 30,000 tons of bar iron, the latter largely used in the manufacture of hot-pressed and cold-punched nuts, washers, etc. Fuel, bituminous coal. George S. Shimer, President; William A. Heinen, Vice President; O. H. Reinhart, Secretary; W. Bruce Clinger, Treasurer.
- Milton Nail Works, F. A. Godcharles Company, Milton. Built in 1875 and enlarged in 1889; destroyed by fire December 3, 1898; rebuilt in 1899 and put in operation in May of that year, using a part of the equipment formerly in the Lewisburg Rolling Mill, at Lewisburg, Pa.; 2 single and 10 double puddling furnaces, 2 heating furnaces, one rotary squeezer, 2 trains of rolls, (one 3-high puddle and one 20-inch finishing,) and 101 cut-nail machines; product, 3, 4, 5, and 6-inch muck bar and iron and steel cut nails and spikes; annual capacity, 15,000 tons of muck bar and 200,000 kegs of nails and spikes. Fuel, coal. Brands for nails, "Fuller Mills" and "Godcharles." F. A. Godcharles, President; W. A. Godcharles, Vice President; W. B. Godcharles, Secretary and Treasurer. Selling agents, Fuller Brothers & Co., 139 Greenwich street, New York.
- Milton Rolling Mill and Forge, American Car and Foundry Company, St. Louis. Works at Milton, Pa.—*See page 221.*
- Montour Rolling Mills Department, Reading Iron Company, Reading. Works at Danville.—*See page 135.*
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. Built in 1883 and first put in operation in January, 1884; 9 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, (one 18-inch muck and one 20-inch plate,) and 45 cut-nail machines; product, iron and steel cut nails and muck bar; annual capacity, 100,000 kegs of cut nails on single turn and 10,000 tons of muck bar on double turn. Fuel, bituminous and an-

thracite coal. Brand, "Van Alen & Co." Sales made by the firm and by Oliver Wade, 18 Broadway, New York.

Pennsylvania Brake Beam Company, lessee, Danville. Mill formerly known as the Co-operative Iron and Steel Works; also as the North Branch Steel Works. Established in 1871; one coal heating furnace and one train of 3-high 24-inch rolls; product, special shapes for brake beams, deck and I beams, etc.; annual capacity, 15,000 tons. Fuel, coal. A plant for the manufacture of shovels is connected with the works but is not used by the present operators. James W. Trenchard, President, and Samuel H. Hitchner, Secretary, Bridgeton, N. J.; E. M. Applebaugh, Vice President, Treasurer, and General Manager, Danville. (One 10-gross-ton acid open-hearth furnace, built in 1882-3, dismantled. Formerly operated by the Danville Bessemer Company; owned by the Danville Shovel and Manufacturing Company; leased by the Pennsylvania Brake Beam Company on December 1, 1907.)

Scranton Bolt and Nut Company, Scranton; New York offices, West Street Building. Built in 1899 and first put in operation November 22, 1899; enlarged in 1905; 6 double puddling furnaces, 5 heating furnaces, one rotary squeezer, 5 trains of rolls, (one 3-high 20-inch muck, one 5-stand 12-inch guide, one 14-inch roughing and 10-inch finishing, one 18-inch bar, and one 16-inch universal, the latter used for rolling odd sizes of bars up to 12 inches wide by one inch thick,) and 6 spike machines; product, merchant bars, bolts, nuts, railroad, dock, and boat spikes, and other similar products; annual capacity, 40,000 tons of merchant bars, 15,000 tons of bolts, nuts, and other forged products, and 40,000 kegs of spikes, 200 pounds to the keg. Fuel, anthracite and bituminous coal and petroleum. Brand, the letter "Z" inclosed in a diamond. A machine shop is connected with the works. E. M. Zehnder, President, L. M. Horton, Secretary and Treasurer, and F. B. Rutter, General Sales Manager, Scranton; C. H. Zehnder, Vice President, New York. Selling agent, C. E. Brodhead, Jr., West Street Building, New York.

Sweet's Steel Company, Williamsport. Works at Newberry, near Williamsport. Built in 1903-4; ground broken in August, 1903; two 20-gross-ton Siemens basic open-hearth steel furnaces, 5 gas producers, 5 heating furnaces, (one Siemens and 4 Sweet's,) 4 trains of rolls, (two 9, one 13, and one 14-inch,) and 3 hammers (one 200, one 1,000, and one 2,000-lb.); first steel made July 27, 1904, and first products rolled September 17, 1904; product, open-hearth ingots, steel castings, special qualities of rolled and forged open-hearth steel, special shapes, and special analysis steel; an-

nual capacity, 12,000 tons of ingots and 20,000 tons of rolled and forged products, including steel castings. Fuel, coal and producer gas. Machine shops and a steel foundry are connected with the works. R. L. Ahles, President and General Manager; W. L. Wright, Vice President; F. M. Sears, Secretary and Treasurer. Williamsport Iron and Nail Works, Williamsport Iron and Nail Company, Williamsport. Built in 1873-4; 5 double puddling furnaces, one coal and one Smith gas heating furnace, 2 trains of rolls, (17 and 18-inch,) and 95 cut-nail machines; product, iron and steel cut nails and muck bar; annual capacity, 200,000 kegs of nails and 3,600 tons of muck bar. Fuel, manufactured gas. Brand, "Williamsport Iron and Nail Co. Nails." C. LaRue Munson, President; John M. Young, Treasurer; George H. Young, Assistant Treasurer; Charles H. Hand, Secretary; John Jenkins, General Manager. Selling agents, E. L. Hand & Co., 616 Market st., Philadelphia; Dietrich Brothers, 344 North st., Baltimore.

Wyoming (The) Shovel Works, Wyoming; sales offices, Scranton, Pa., and New York City. Rolling mill added to a shovel plant in 1900 and first put in operation in 1901; 2 heating furnaces and one 20-inch train of rolls; product, shovel plates and light steel sheets; annual capacity, 6,000 tons. Fuel, anthracite and bituminous coal. Also make railroad, contractors', mine, etc., shovels; annual capacity, 50,000 dozen. Henry Belin, Jr., President; Nathaniel G. Robertson, Treasurer and Manager.

Number of rolling mills and steel works in the Upper Susquehanna Valley: 15. Of these one makes basic open-hearth steel.

LOWER SUSQUEHANNA VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Bloomaries in Franklin, York, Lebanon, Dauphin, and Lancaster Counties.

COKE AND MIXED ANTHRACITE AND COKE FURNACES—19.

Aurora Furnace, Susquehanna Iron Company, Columbia. One anthracite coal and coke stack at Wrightsville.—*See page 151.*

Bird Coleman Furnaces, The Lackawanna Iron and Steel Company, lessee, Lebanon. Furnaces at Cornwall. Two stacks; fuel, coke and occasionally anthracite coal mixed with coke.—*See page 102.*

Chickies Furnaces, Standard Iron Mining and Furnace Company, 306-7 Pennsylvania Building, Philadelphia. Furnaces at Chickies. Two stacks: No. 1, 65 x 14; original stack built in 1845 and blown in January 15, 1846; rebuilt in 1887 and 1902; No. 2, 66 x 14; original stack built in 1854 and blown in in 1855; rebuilt in 1889 and 1902-3; iron stoves; fuel, anthracite coal and coke; ore, magnetic; product, low-phosphorus pig iron; total annual capacity, 33,500 tons. Brand, "Chickies." Connected with the furnaces is

- an iron-ore briquetting plant; daily capacity, 140 tons. (Formerly called Standard Furnaces.)—*Last active in 1900. For sale.*
- Colebrook Furnaces, The Lackawanna Iron and Steel Company, Lebanon. Furnaces at Lebanon. Two stacks; fuel, coke and occasionally some anthracite coal mixed with coke.—*See page 102.*
- Lebanon Furnaces, The Pennsylvania Steel Company, Philadelphia. Furnaces at Lebanon. Two stacks; fuel, coke.—*See page 144.*
- Lebanon Valley Furnace, Lebanon Valley Furnace Company, Lebanon. One stack, $64\frac{1}{2} \times 14$, built in 1867, blown in December 23, 1867, remodeled in 1884, and rebuilt in 1904; two Whitwell stoves; fuel, $\frac{1}{4}$ anthracite coal and $\frac{3}{4}$ coke; ore, principally Cornwall; product, Bessemer, low-phosphorus, and foundry pig iron; annual capacity, 24,000 tons. Brand, "Lebanon Valley." E. Burd Grubb, President; George E. Meily, Secretary and Treasurer; L. W. Richards, Assistant Treasurer and Manager. Selling agents, Ernest Law & Co., Harrison Building, Philadelphia.—*Active in 1907.*
- Lochiel Furnace, The Pennsylvania Steel Company, Philadelphia. Furnace at Harrisburg. One stack; fuel, anthracite coal and coke.—*See page 144.*
- North Cornwall Furnace, The Lackawanna Iron and Steel Company, lessee, Lebanon. Furnace at Cornwall. One stack; fuel, coke and occasionally some anthracite coal mixed with coke.—*See page 102.*
- Paxton Furnaces, Central Iron and Steel Company, Harrisburg. Two stacks; fuel, anthracite coal and coke.—*See page 149.*
- Steelton Furnaces, The Pennsylvania Steel Company, Philadelphia. Furnaces at Steelton. Four stacks; fuel, coke alone and mixed anthracite coal and coke.—*See pages 144-45.*
- Vesta Furnace, Susquehanna Iron Company, Columbia. Furnace at Watts. One stack; fuel, anthracite and coke.—*See page 151.*
- Number of mineral fuel furnaces in the Lower Susquehanna Valley: 19. Of these 9 use anthracite coal and coke mixed, 5 use coke, and 5 use coke and occasionally anthracite coal and coke mixed.

MIXED CHARCOAL AND COKE FURNACES—1.

- Lebanon Reduction Company, Lebanon. One small experimental stack, 25×4 , built in 1906; first blown in with charcoal as fuel October 8, 1906; fuel changed to charcoal and coke mixed; product, low-phosphorus pig iron; annual capacity, 2,200 tons. Brand, "L-R-C." The furnace is operated for experimental purposes only and pig iron is not made for sale; may be enlarged and pig iron made for the general market. Charcoal pits are connected with the furnace. Edgar A. Weimer, Owner; H. B. Weaver, Superintendent.—*Active in 1906.*

Number of mixed charcoal and coke furnaces in the Lower Susquehanna Valley: one stack.

Total number of furnaces in the Lower Susquehanna Valley: 20 stacks. Of these 9 use anthracite coal and coke mixed, 5 use coke alone, 5 use coke and occasionally anthracite coal and coke mixed, and one uses charcoal and coke mixed.

BLOOMARIES—1.

Lucknow Forge, Lucknow Iron and Steel Company, lessee, Harrisburg. Forge at Lucknow Station, P. R. R.—*See page 115.*

Number of bloomaries in the Lower Susquehanna Valley which make charcoal blooms for sale: one.

ROLLING MILLS AND STEEL WORKS—25 COMPLETED AND 1 PROJECTED.

Central Iron Works, Central Iron and Steel Company, Harrisburg.—*See page 150.*

Central Works, American Iron and Steel Manufacturing Company, Lebanon.—*See page 137.*

Chambersburg Engineering Company, Chambersburg; branch offices, 432-34 Bourse Building, Philadelphia. Original works built in 1897; open-hearth steel department added in 1906-7; three 40-gross-ton acid Holcroft stationary furnaces; construction commenced in September, 1906; first steel may be made early in 1908; product, heavy steel castings up to 200,000 lbs., principally for the use of the company; annual capacity, 18,000 tons. Fuel, producer gas. Also builds hydraulic machinery, steel hammers, etc. Office of President vacant; James S. Austin, Treasurer, 432 Bourse Building, Philadelphia; H. B. Price, Vice President, Land Title Building, Philadelphia; James A. Smith, Secretary, Purchasing Agent, and General Sales Manager, Chambersburg.

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) lessees, Harrisburg. Built in 1867; 18 single puddling and 3 heating furnaces, 2 trains of rolls, (one 20-inch puddle and one 16-inch plate,) and 103 cut-nail machines; product, iron and steel nails and muck bar; annual capacity, 260,000 kegs of nails and 11,000 tons of muck bar. Fuel, coal. Brand, "Chesapeake Nail Works." A machine shop is connected with the works. James B. Bailey, President; Edward Bailey, Vice President; John C. Harvey, Secretary, Treasurer, Purchasing Agent, and Sales Manager. (Owned by the Central Iron and Steel Company.)—*See page 150.*

Columbia Mill, Susquehanna Iron Company, Columbia.—*See page 151.*

East End Mill, Susquehanna Iron Company, Columbia.—*See page 151.*

East Works, American Iron and Steel Manufacturing Company, Lebanon.—*See page 137.*

Hanover Union Steel Casting Company, Incorporated, East Chestnut st., Hanover. Built in 1906 and first steel made August 15, 1906; product, small steel castings by a special process; annual capacity, 400 tons. Fuel, coal, coke, and wood. John Fitz, Receiver.—*Idle. Company is to be reorganized.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Original plant for the manufacture of wrought iron and steel pipe built in 1900; open-hearth steel plant and rolling mill added in 1902-3; first steel made August 5, 1903; first products rolled in January, 1904; 2 continuous regenerative billet and slab heating furnaces and 4 trains of rolls (one 32 and one 20-inch blooming, the latter connected with a 20-inch finishing mill, and one 3-stand 14-inch and one 3-stand 20-inch finishing); three 40-gross-ton Siemens basic open-hearth steel furnaces; product, steel ingots, slabs, billets, and skelp; annual capacity, from 60,000 tons to 75,000 tons of ingots and 60,000 tons of rolled material. Fuel, manufactured gas for heating furnaces and fuel oil for open-hearth furnaces. Brand, "Harrisburg P. & P. B. Co." A plant for the manufacture of wrought iron and steel pipe, with an annual capacity of 20,000 tons, is connected with the works; also departments for the manufacture of iron, brass, and copper coils, feedwater heaters, freezing plates, and seamless steel cylinders for high-pressure gases; also a small repair machine shop. J. Hervey Patton, President and General Manager; E. Z. Wallower, Vice President; W. T. Hildrup, Jr., Secretary and Treasurer.

Harrisburg Rolling Mill Company, Harrisburg. Original works built in 1865 to roll rails; 4 single and 15 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (two 19-inch muck and one 9 and one 16-inch merchant bar and skelp); product, refined bar and skelp iron; annual capacity, 18,000 tons of bars and 12,000 tons of skelp. Fuel, bituminous coal. A machine repair shop for the use of the company is connected with the works. Robert C. Neal, President and Treasurer, A. S. Matheson, Vice President and C. E. Covert, Secretary, Harrisburg; William Ellis, Sales Agent, Havemeyer Building, New York, and 5236 Jefferson st., Philadelphia. Selling agents, Charles K. Barns & Co., Real Estate Trust Building, Philadelphia.

Heany Fire Proof Wire Company, York. Built in 1900; product, fire-proof insulated wire. Connected with the plant is one 10-gross-ton idle open-hearth steel furnace; first put in operation December 13, 1900. (Formerly operated by the Norway Iron and Steel Company; acquired by the Heany Fire Proof Wire Company on July 1, 1906.)—*Wire department in operation; open-hearth furnace idle and for sale.*

Janson Steel and Iron Company, Columbia. Construction commenced in July, 1905; completed and put in operation in October, 1906; 5 heating furnaces and 3 trains of 3-high rolls (one 22-inch billet, one 18-inch bar, and one 12-inch merchant); product, bar iron and steel; annual capacity, 20,000 tons. Fuel, bituminous coal. Joseph Janson, President; Valentine Janson, Secretary and Treasurer; Frank Janson, Manager and Selling Agent. (This company formerly operated a rolling mill at Oxford, N. J., which was dismantled in 1905.)

Lalance and Grosjean Manufacturing Company, Harrisburg; main offices, 19 Cliff st., New York; branch offices, Boston and Chicago. Built in 1892-3 and first put in operation February 22, 1893; 14 heating furnaces, 5 annealing furnaces, 6 hot mills, (one 3-high 22-inch bar and four 32-inch and one 38-inch tin,) and 3 stands of 30-inch cold mills; product, sheet steel and black plates for tinning; annual capacity, 2,500 tons of sheets and 7,500 tons of black plates. Brand, "L. & G." Fuel, bituminous coal and manufactured gas. A foundry with an annual capacity of about 1,500 tons of gray iron castings is connected with the works; also a machine shop. J. H. Walbridge, President, James D. Fleming, Vice President and Treasurer, E. W. Ball, Second Vice President, and John H. Stevenson, Secretary, New York.—*See Tinplate and Terne Plate Works, Part III.*

Lebanon Iron and Steel Company, Lebanon. Built in 1867; 14 double puddling furnaces, 9 heating furnaces, 7 trains of rolls, and one hammer; product, boiler plates, sheets, skelp, merchant bars, washers, and muck bar; annual capacity, 20,000 tons of plates and skelp iron. One 40-gross-ton basic open-hearth steel furnace added in 1902; not put in operation down to October 1, 1907; product, ingots; estimated annual capacity, 24,000 tons; another 40-gross-ton basic furnace is projected. A forge, added to the works in 1885-6, has 12 fires and 2 hammers; product, charcoal scrap blooms, all consumed in the works; weekly capacity, 120 tons. Fuel, coal in the rolling mill and charcoal in the forge. Samuel E. Light, Receiver, President, and Manager.

Lebanon Steel Casting Company, Lebanon; branch offices, 140 Cedar st., New York. Built in 1906-7 and first steel made March 11, 1907; four 4-pot crucible steel-melting furnaces; 16 pots can be used at a heat; product, small steel castings; annual capacity, 500 tons. Fuel, crude oil. M. H. Treadwell, President, New York; Grant Weidman, Vice President, W. I. Gassert, Secretary, and W. E. Farrell, Treasurer, Lebanon.

Lebanon Valley Iron Company, Lebanon. Built in 1902-3, utilizing machinery from the abandoned Norristown Iron Works, at Nor-

ristown, Pa.; new machinery and furnaces also installed; first put in operation January 12, 1903; plant now contains 9 double puddling furnaces, 5 heating furnaces, and 2 trains of rolls (one 12 and 8-inch combination and one combination with 16-inch roughing and 10-inch finishing rolls); product, muck and scrap bars and merchant bar iron; annual capacity, 30,000 tons of bar iron. Fuel, bituminous coal. H. H. Light, President; William S. Davis, Secretary; S. P. Light, Treasurer.

Open Hearth Steel Works, Central Iron and Steel Company, Harrisburg.—*See page 150.*

Paxton Rolling Mills, Central Iron and Steel Company, Harrisburg.—*See page 150.*

Penn Iron Works, Penn Iron Company, Limited, Lancaster. First put in operation in April, 1873; 7 double puddling furnaces, 2 busheling furnaces, 5 heating furnaces, 4 trains of rolls, (18-inch puddle, 8 and 10-inch guide, and 16-inch bar,) and 2 hammers; product, merchant bar iron, shafting iron, screw blanks, hammered and rolled axles, car forgings, bridge work, railroad splices, fish joints, bolts, nuts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 25,000 tons of rolled products. Fuel, bituminous coal. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Treasurer; John Lorentz, Secretary.

Pennsylvania Steel Works, The Pennsylvania Steel Company, Philadelphia. Works at Steelton.—*See pages 145-47.*

Susquehanna Mill, Susquehanna Iron Company, Columbia.—*See page 151.*

Union Street Mill, Susquehanna Iron Company, Columbia.—*See pages 151-52.*

West End Iron Company, Lebanon, Pa. Built in 1872-4; 6 double puddling furnaces, 2 heating furnaces, 3 trains of rolls, (one 20-inch muck and one 8 and one 14-inch finishing,) and one hammer; product, muck bar, bar iron, skelp, socket iron, and hand-made chains; annual capacity, 10,000 tons. Fuel, bituminous coal and coke. Chain works erected in 1884; product, all sizes of iron hand-made chains for cranes, dredges, marine railways, and ship cables; also pitch chains; annual capacity, 1,200 tons. C. Shenk, President; Eli Attwood, Vice President and General Manager; H. F. Mattern, Secretary and Treasurer. (Formerly operated by the West End Rolling Mill Company; acquired by the West End Iron Company on August 1, 1907.)

West Works, American Iron and Steel Manufacturing Company, Lebanon.—*See page 137.*

York Mill, Susquehanna Iron Company, Columbia. Works at York.—*See page 152.*

PROJECTED STEEL-CASTING PLANT.

Weimer Chain and Iron Company, Lebanon. Built in 1907 and first put in operation on July 15 of that year; now manufactures iron chains; contemplates erecting one 5-gross-ton top-blown Bessemer converter for the manufacture of steel castings. Edgar A. Weimer, President; Asa A. Weimer, Vice President and Treasurer; George E. Holly, Secretary and General Manager. (Formerly called the Lebanon Valley Chain Company.)

Number of rolling mills and steel works in the Lower Susquehanna Valley: 25 completed and one projected. Of these one makes Bessemer steel, 6 are equipped for the manufacture of open-hearth steel, 2 make crucible steel, one makes steel castings by a special process, and one plant for the manufacture of top-blown Bessemer steel castings is projected.

JUNIATA VALLEY.

This district embraces Blast Furnaces, Rolling Mills, Steel Works, and Charcoal Bloomeries in Centre, Bedford, Huntingdon, Mifflin, and Blair Counties; also in a part of Perry County.

COKE AND MIXED ANTHRACITE AND COKE FURNACES—10.

Bellefonte Furnace, Bellefonte Furnace Company, Bellefonte. One stack, 70 x 16, built in 1887 and put in blast February 1, 1888; remodeled and improved in 1900; three Whitwell stoves; fuel, coke; ores, $\frac{1}{2}$ native and $\frac{1}{2}$ Lake Superior; product, foundry and forge pig iron; annual capacity, 40,000 tons. Brand, "Bellefonte." C. M. Clement, President; E. L. Welsh, Vice President; William J. McHugh, Treasurer; L. T. Munson, Secretary and Superintendent. Selling agents, Crocker Brothers, 99 John st., New York.—*Active in 1907.*

Colonial Furnaces, Colonial Iron Company, Riddlesburg. Two alternate stacks, each 60 x 14: No. 1 built in 1868 and No. 2 in 1870; No. 1 first put in blast July 4, 1869, and No. 2 March 4, 1871; No. 2 was remodeled in 1906; four Player stoves; fuel, Broad Top coke made from coal mined on the furnace property; ores, Lake Superior and native; product, foundry and forge pig iron; specialty, a strong, soft, fluid foundry pig iron; total annual capacity, 36,000 tons. Brands, "Norway" and "Colonial." Henry H. Adams, Jr., President, and C. M. Smith, Secretary and Treasurer, 149 Broadway, New York; John M. Reynolds, Vice President, Bedford, Pa.; William Lauder, General Manager, Riddlesburg, Pa. Selling agents, Henry H. Adams & Co., 149 Broadway, New York.—*Active in 1907.*

Earlston Furnace, Joseph E. Thropp, Earlston. One stack; fuel, coke. (Formerly called Everett Furnace.)—*See page 152.*

Marshall Furnace, Juniata Furnace and Foundry Company, Newport; Philadelphia offices, Girard ave. below Front st. One stack, 60 x 13, built in 1871 and blown in in July, 1872; remodeled in 1888-9; two Durham iron stoves; two Roberts stoves, each 70 x 19, are being added; fuel, anthracite coal and coke; ores, local hematite from the company's mines and Lake Superior; product, foundry pig iron; annual capacity, 18,000 tons. Brands, "Marshall" and "Juniata." Alfred Marshall, President; Edward E. Marshall, Vice President and General Manager; Edward T. Adams, Secretary; F. W. Marshall, Treasurer. Sales made by the company at its Philadelphia offices.—*Active in 1907.*

Nittany Iron Company, Bellefonte. One stack, 70 x 15, built in 1887 and blown in in March, 1888; three Whitwell stoves, 50 x 18; fuel, Connellsville coke; ores, hematite from the company's mines in Centre county and Lake Superior; product, foundry and forge pig iron; annual capacity, 36,000 tons. Brand, "Nittany." A machine shop is connected with the furnace. William A. Moore, President and General Manager; Frank H. Clemson, Vice President; William W. Waddle, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1907.*

Rockhill Furnaces, Rockhill Furnace Company, lessee, Rockhill Furnace, Huntingdon county; telegraph address, Orbisonia. Two alternate stacks: Nos. 1 and 2, each 65 x 15, built in 1875 and blown in January 1, 1876; No. 1 rebuilt in 1886 and 1903 and No. 2 in 1902; four Pollock hot-blast stoves; fuel, Broad Top coke; ores, fossil from the company's mines and Lake Superior; product, foundry and forge pig iron; total annual capacity, 36,000 tons. Brand, "Rockhill." Connected with the furnaces are 132 coke ovens with an annual capacity of 60,000 net tons. F. P. Howe, Manager, 230 Drexel Building, Philadelphia; E. P. Ross, Superintendent, Rockhill Furnace, Pa. Selling agents, Crocker Brothers, 99 John st., New York. (Owned by the Rockhill Iron and Coal Company, 320 Walnut st., Philadelphia.)—*Active in 1907.*

Saxton Furnaces, Joseph E. Thropp, Earlston. Furnaces at Saxton. Two stacks; fuel, coke.—*See pages 152-53.*

Number of mineral fuel furnaces in the Juniata Valley: 10. Of these 9 use coke and one uses anthracite coal and coke mixed.

CHARCOAL FURNACES—2.

Eagle Furnace, Eagle Iron Company, lessee, Roland; telegraph address, Curtin. One stack, 29 x 8½, built in 1848; idle for a number of years; revived in 1899; original furnace built in 1817 half a mile from the present site; cold blast; open top, open-hearth, and closed tuyere; water power; fuel, charcoal; ore,

Nittany Valley, mined by the company; product, pig iron for rolls and dies; annual capacity, 2,400 tons. John I. Potter, President; H. R. Curtin, Superintendent. Selling agents, Rogers, Brown & Co., New York and branch houses. (Owned by several estates.)—*Active in 1907.*

Hecla Furnace, The McCoy-Linn Iron Company, lessee, Milesburg. One stack, 32 x 8½, built in 1864; cold blast; water power; open top; fuel, charcoal; ore, hematite from Nittany Valley; product, forge and foundry pig iron; annual capacity, 1,800 tons. Brand, "Hecla." (Owned by McCoy & Linn.)—*Active in 1907. See Milesburg Iron Works on this page and on page 289.*

Number of charcoal furnaces in the Juniata Valley: 2.

Total number of furnaces in the Juniata Valley: 12. Of these 9 use coke, one uses anthracite and coke mixed, and 2 use charcoal.

BLOOMARIES—3.

Curtin Forge Company, Roland; telegraph address, Bellefonte. Built in 1809; remodeled in 1901; 12 fires and one hammer; water power; product, scrap blooms and slabs for general purposes; specialty, blooms for boiler plate, tubes, rivets, and screw rods; annual capacity, 3,000 tons. Fuel, charcoal. Brand, "Eagle." Charcoal pits with an annual capacity of 12,500 bushels are connected with the works. H. R. Curtin, President and General Manager. Sales made by the company.

Milesburg Iron Works, The McCoy-Linn Iron Company, lessee, Milesburg. Built in 1830; 6 fires and one hammer; water power; product, charcoal blooms; annual capacity, 2,500 tons. Fuel, charcoal. (Owned by McCoy & Linn.)—*See Hecla Furnace on this page and Milesburg Iron Works, page 289.*

Tyrone Forges, The Tyrone Iron Company, Harrisburg. Works at Tyrone Forges. Forges established in 1809 and rebuilt in 1870; 10 refinery fires, one double run-out, and one large steam hammer; product, charcoal blooms for the use of the company and for sale; annual capacity, 7,500 tons. Fuel, charcoal. Sales made by the company.—*See Tyrone Forges, pages 289-90.*

Number of bloomaries in the Juniata Valley which make charcoal blooms, slabs, etc., for sale and for their own use: 3.

ROLLING MILLS AND STEEL WORKS—8.

Altoona Iron Company, Altoona. First put in operation in April, 1873; 11 double and 6 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, (one 18-inch muck and two 8 and one 16-inch finishing,) and one 3-ton hammer; product, refined bar, band, hoop, oval, half round, and scroll iron; specialties, brake-shoe key iron, brake levers, and padded switch plates rolled and

furnished in continuous bars; annual capacity, 24,000 tons. Fuel, bituminous coal. Brand, "Altoona." J. P. Levan, President; H. K. McCauley, Secretary and Treasurer.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg. Built in 1860; one double and 7 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, (one 8-inch, one 16-inch, and two 18-inch,) and 27 cut-nail machines; product, merchant bar, channel, skelp, and hoop iron, flat and small T rails, and cut nails and cut spikes; annual capacity, 12,000 tons of bar iron and 60,000 kegs of nails and spikes. Fuel, bituminous coal. Brand for bar iron, "I. X. L." B. Frank Conner, President and General Manager; O. W. Gardner, Vice President; J. D. Hemphill, Treasurer; Thomas J. Hemphill, Secretary.

Howard Rolling Mills, Howard Iron and Tool Company, Bellefonte. Works at Howard. Built in 1840; 2 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); steam and water power; product, bar iron and charcoal iron bars and rods, consumed by the company in the manufacture of rafting dogs, weldless clevises, weldless brake rod jaws, weldless steel hoes, weldless steel rakes, coal picks, etc.; annual capacity, 5,500 tons. Fuel, bituminous coal. Brand, "Howard." A machine shop is connected with the works. H. W. Chamberlin, President, Milton; H. E. Jenkins, Secretary and Purchasing Agent, and W. R. Jenkins, Treasurer and General Manager, Bellefonte. (Formerly operated by the Jenkins Iron and Tool Company; acquired by the Howard Iron and Tool Company in September, 1904.)

Juniata Rolling Mill, The Eleanor Iron Company, Hollidaysburg; branch offices, Harrisburg. Built and put in operation in 1866; 13 single puddling furnaces, 2 heating furnaces, one rotary squeezer, 2 trains of rolls, (one 20-inch puddle and one 10-inch guide and bar,) and one 3-ton Morgan hammer; product, merchant iron, rounds, half rounds, squares, hexagons, socket iron, and grooved skelp iron; annual capacity, 11,000 tons of puddled iron and 10,000 tons of bar and skelp iron. Fuel, bituminous coal. Brands, "Eleanor" and "Juniata." R. C. Neal, President, Harrisburg; H. L. Sholly, Secretary and Treasurer, Tyrone.

Logan Iron and Steel Works, Logan Iron and Steel Company, Burnham, 4 miles from Lewistown, on the M. & C. C. R. R.; Philadelphia offices, North American Building. Started in 1869, partly destroyed by fire in 1894, and rebuilt in the same year; one single and 10 double puddling furnaces, 7 heating furnaces, one heavy blooming hammer for Norway and horseshoe iron and hammered charcoal bars, 4 trains of rolls, (one 8-inch with 10-inch tandem roughing and one 12 and two 18-inch,) and one 300,000-lb. ma-

chine for testing all kinds of iron, coupling links, chains, etc.; product, charcoal and refined bar iron, staybolt, crown bar, bridge iron, flats, rounds, squares, ovals, half ovals, half rounds, band iron, bevel-edge iron, angles, wagon and buggy tire in round or square edge, truck sides, switch iron, skelp, drill rods to 4½ inches in diameter, and special small shapes of all sorts; annual capacity, 35,000 tons of rolled iron. Fuel, bituminous coal. Brands, "Logan," "Logan Staybolt," and "Logan Refined." Frank G. Kennedy, President, and Frank G. Kennedy, Jr., Secretary and Treasurer, North American Building, Philadelphia.

Milesburg Iron Works, The McCoy-Linn Iron Company, lessee, Milesburg. Built in 1830; 3 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, (one 8 and two 15-inch,) and one 3½-ton hammer; steam and water power; product, all sizes of bar iron and soft wire rods; annual capacity, 2,250 tons of bars and 1,350 tons of rods. Fuel, bituminous coal. A plant for the manufacture of wire is connected with the works; also a factory for the manufacture of all kinds of polished and cable chains. Frank McCoy, President and Manager; Edmund Blanchard, Secretary and Treasurer. (Owned by McCoy & Linn.)—*See Hecla Furnace and Milesburg Iron Works, page 287.*

Standard (The) Steel Works Company, Harrison Building, Philadelphia; branch offices, 623 Railway Exchange Building, Chicago; 29 Chamber of Commerce, Richmond, Va.; 1511 Empire Building, New York; 914 Security Building, St. Louis; Flood Building, San Francisco; 306 Lumber Exchange, Portland, Ore.; 32 Maynard Building, Seattle; Majestic Building, Denver; 312 Electric Building, Cleveland; and 516 Pioneer Press Building, St. Paul. Works at Burnham, Pa. Built in 1869 and since enlarged; now contains 35 heating furnaces, 32 hammers, 4 tire mills, 6 revolving acid open-hearth steel furnaces, (two 15, one 20, and three 50-gross-ton,) one wheel rolling mill, and 3 hydraulic presses (one 500-ton, one 5,000-ton, and one 7,500-ton); first open-hearth steel made March 18, 1895; annual capacity, 100,000 tons of open-hearth steel ingots and steel castings, 75,000 tons of steel locomotive and car-wheel tires and steel-tired wheels with centres of cast iron or cast steel, 8,000 tons of solid steel-rolled wheels, 24,000 tons of iron and steel forgings, 20,000 tons of iron castings, and 5,000 tons of steel springs. Fuel, coal. Brand, the letter "S" between anchors. Wm. Burnham, President and Treasurer, and Robert Radford, Secretary and Assistant Treasurer, Philadelphia. (Formerly called the Standard Steel Works.)

Tyrone Forges, The Tyrone Iron Company, Harrisburg. Works at Tyrone Forges. Forges established in 1809 and rebuilt in 1870;

rolling mill added in 1883 and enlarged in 1898; 2 regenerative gas heating furnaces, 2 direct coal-fired Lauth heating furnaces, and 2 trains of rolls (one 16-inch grooved skelp and one 23 x 54-inch 2-high plate); product, sheared and grooved rolled iron and steel skelp; specialty, knobbled charcoal iron boiler-tube skelp; annual capacity, 16,000 tons. Fuel, manufactured gas and bituminous coal. Brand, "Tyrone." Trade mark, the letter "T" in a diamond. John Y. Boyd, President and Treasurer, Harrisburg. Sales made by the company.—*See Tyrone Forges, page 287.* Number of rolling mills and steel works in the Juniata Valley: 8. Of these one makes open-hearth steel by the acid process.

PITTSBURGH AND ALLEGHENY COUNTY.

Embraces Blast Furnaces, Charcoal Bloomeries, and Rolling Mills and Steel Works in Pittsburgh and Allegheny County.

COKE FURNACES—44 COMPLETED AND 3 BUILDING.

- Carrie Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces at Rankin. Seven stacks; fuel, coke.—*Page 6.*
- Clairton Furnaces, Carnegie Steel Company (of New Jersey). Furnaces at Clairton. Three stacks; fuel, coke.—*See pages 6-7 and 76.*
- Clinton Furnace, Clinton Iron and Steel Company, West Carson st., (post-office box 177,) Pittsburgh; New York offices, Blair Building, 24 Broad st. One stack, 85 x 17, built in 1859, rebuilt in 1889-90, 1893, and 1900-1; four C. H. Foote hot-blast stoves; fuel, coke; ore, Lake Superior; product, Bessemer and forge pig iron, special car-wheel pig iron, and an exceedingly soft and fluid foundry iron of rare strength especially adapted for light work and fine machinery castings; annual capacity, 90,000 tons. Brands, "Hector" and "Clinton." J. W. Friend, President; Charles W. Friend, Vice President and Furnace Superintendent; T. W. Friend, Treasurer and General Sales Agent; F. N. Hoffstot, Assistant Treasurer.—*Active in 1907.*
- Duquesne Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces at Cochran. Four completed and 2 building stacks; fuel, coke.—*See page 7.*
- Edgar Thomson Furnaces, Carnegie Steel Company (of New Jersey). Furnaces at Bessemer. Eleven coke stacks.—*See pages 7-8.*
- Edith Furnace, American Steel and Wire Company of New Jersey. Furnace at Allegheny, Pa. One stack; fuel, coke.—*See page 42.*
- Eliza Furnaces, Jones and Laughlin Steel Company, Pittsburgh. Five stacks; fuel, coke.—*See page 157.*
- Isabella Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces at Etna. Three stacks; fuel, coke.—*See page 8.*

- Lucy Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces on Fifty-first st., Pittsburgh. Two stacks; fuel, coke.—*See page 8.*
- National Works, Monongahela Furnaces, National Tube Company, Pittsburgh. Furnaces at McKeesport. Three completed stacks and one stack building; fuel, coke.—*See page 36.*
- Neville Furnace, American Steel and Wire Company of New Jersey, Cleveland. Furnace on Neville Island, Pa. One stack; fuel, coke. (Formerly called Neville Island Furnace.)—*See page 43.*
- Shoenberger Furnaces, American Steel and Wire Company of New Jersey. Two stacks at Pittsburgh; fuel, coke.—*See page 43.*
- Soho Furnace, Jones and Laughlin Steel Company, Pittsburgh. One stack; fuel, coke.—*See page 157.*
- Number of coke furnaces in Pittsburgh and Allegheny county: 44 completed stacks and 3 stacks building. No charcoal furnaces.

BLOOMARIES—1.

- Pennsylvania Swedish Iron Company, Cheswick, Pa. Construction commenced in November, 1905; first blooms hammered March 1, 1906; 8 knobbling fires and 2 hammers (one 6,000-lb. and one 4,000-lb.); product, hammered blooms for sale from soft-steel scrap and wrought-iron scrap; annual capacity, 6,000 tons. Fuel, charcoal. A. M. Bell, President, and R. M. Graff, Secretary and Treasurer, Pittsburgh; Ambrose Beard, Vice President and General Manager, Cheswick. Sales made at Cheswick.
- Number of bloomaries in Allegheny county which make hammered blooms for sale from soft-steel and wrought-iron scrap: 1.

ROLLING MILLS AND STEEL WORKS—66 COMPLETED AND 2 PROJECTED.

- Allegheny Steel Company, Farmers Bank Building, Pittsburgh. Works at Brackenridge. Built in 1900–1; 8 sheet furnaces, 8 pair furnaces, 12 annealing furnaces, one 3-high 29-inch bar mill, one 3-high 30 x 86-inch plate mill, 8 sheet mills, (one 26 x 50, three 26 x 40, two 26 x 36, and two 26 x 46-inch,) 6 pairs of 22 x 50-inch cold mills, 12 billet, plate, and sheet shears, and four 50-gross-ton basic open-hearth steel furnaces, one built in 1901, one in 1902, one in 1904, and one in 1906; first products rolled in July, 1901, and first steel made September 19, 1901; product, ingots, billets, sheet bars, tank and boiler steel, sheet steel, and skelp; annual capacity, 120,000 tons of ingots, 70,000 tons of billets and sheet bars, 36,000 tons of steel plates or heavy skelp, and 32,000 tons of sheet steel. Fuel, coal and natural gas. A machine repair shop is connected with the works; also a small steel foundry which makes castings for the company's use.

Alfred Hicks, President; L. W. Hicks, Vice President; R. D. Campbell, Secretary; H. E. Sheldon, Treasurer and General Manager; F. H. Stephens, Auditor. Eastern selling agents, Chandler & Floyd, 143 Liberty st., New York. (Formerly operated by the Allegheny Steel and Iron Company; acquired by the Allegheny Steel Company on June 22, 1905.)

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Works on the South Side.—*See page 158.*

Anderson-DuPuy Works, Crucible Steel Company of America, Pittsburgh. Works at McKees Rocks. (Formerly called the Pittsburgh Steel Works.)—*See pages 162-63.* ✓

Black Diamond Steel Works, Crucible Steel Company of America, Pittsburgh.—*See page 163.*

Braddock Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Braddock, Pa.—*See page 44.*

Byers (A. M.) Company Works, A. M. Byers Company, Pittsburgh. Works on Sixth st., South Side.—*See page 170.*

Carbon Steel Works, Carbon Steel Company, Thirty-second st., Pittsburgh; New York offices, Havemeyer Building. Built in 1862 and rebuilt in 1888; 2 direct-air heating furnaces, 6 soaking pits, eight 50-gross-ton open-hearth steel furnaces (5 basic and 3 acid) built in 1888 and subsequent years, 2 trains of rolls, (one 36-inch universal and one 128-inch plate,) 3 hammers, (one 6,000-lb. and two 1,000-lb.,) and one 42-inch hot saw; product, acid and basic open-hearth steel ingots, universal rolled plates, sheared plates, 5-ply Carbon-chrome safe plates, and locomotive driving axles, pins, and rods; annual capacity, 125,000 tons of ingots and 85,000 tons of finished plates. Fuel, natural and producer gas except under boilers. Brand, "Carbon." Frank B. Robinson, President, John D. Slayback, Treasurer, and R. S. Baldwin, Secretary, 26 Cortlandt st., New York. Selling agents, E. G. Buchanan, Havemeyer Building, New York; Charles L. Harris, 527 North Second st., St. Louis; Edward K. Harris, Fisher Building, Chicago.

Carnegie Tube Company, Carnegie. Built in 1901-2; first tubes made January 9, 1902, and first products rolled early in May, 1902; 3 heating furnaces and one 12-inch train of grooved rolls; product, skelp iron; annual capacity, 30,000 tons. Fuel, coal and producer and natural gas. A plant for the manufacture of wrought-iron pipe is connected with the works; sizes, from $\frac{1}{4}$ of an inch to 3 inches; annual capacity, 20,000 tons. A. A. Hutchinson, President; R. M. Vincent, Vice President; O. F. Grant, Secretary and Treasurer.—*Idle and for sale. Address John A. Scott, 6023 Penn ave., Pittsburgh.*

Central Expanded Metal Company, Chess Brothers, 541 Wood st.,

Pittsburgh. Works at Rankin Station. Built in 1886 and enlarged in 1888; one gas heating furnace and one 3-high 24-inch plate train; product, light steel plates for nails, straps, tacks, and stamping and die work; annual capacity, 12,000 tons of rolled products.—*Idle*. The works also contain 8 expanded metal machines for making steel fireproof lathing, concrete armor, fencing, screens, etc. Fuel, coal for steam and natural gas for heating and annealing. (Anchor Nail and Tack Works, built in 1842, and formerly equipped with hot trains of rolls and operated in part under lease by Neal Brothers, dismantled in 1905; tack department also dismantled.)

Clairton Steel Works, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Works at Clairton.—*See pages 11 and 76-77*.

Clark Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Pittsburgh.—*See page 11*.

Continental Works, Rolling Mills, National Tube Company, Pittsburgh. (Formerly called the Elba Rolling Mills.)—*See page 37*.

Crescent Steel Works, Crucible Steel Company of America, Pittsburgh. Works, Forty-ninth to Fifty-first sts.—*See page 164*.

Damascus Tool Steel Company; general offices, Thirty-second and Smallman sts., Pittsburgh. Works at Carnegie. Built in 1897; 8 crucible steel-melting holes with an annual capacity of 500 tons of ingots, one cementing furnace, one 10-gross-ton acid open-hearth steel furnace with an annual capacity of 1,000 tons of ingots, 2 heating furnaces, 3 bar mills, (two 10 and one 16-inch,) and 4 hammers (one 600-lb., one 750-lb., one 1,500-lb., and one 6,000-lb.); product, steel bars and Damascus and nickel steel for tools, dies, etc.; also angles, ell bars, etc.; annual capacity of rolled and forged products, 10,000 tons. Fuel, coal and natural gas. Brands, "Damascus," "Nickel," and "Carbon." A department for drawing wire and drill rods is connected with the works. (Formerly owned and operated by the Damascus Nickel Steel Company; acquired by the present company in 1907.)

Demmler Works, Firth-Sterling Steel Company, McKeesport. Works at Demmler.—*See pages 172-73*.

Duquesne Steel Foundry Company, Arrott Building, Pittsburgh. Works at Kendall Station, P. & L. E. R. R., (post-office address of works, Coraopolis.) Two 25-gross-ton acid open-hearth steel furnaces built in 1900 and first steel made August 24, 1900; two 2-gross-ton Tropenas steel converters and one cupola added in 1906-7 and first blow made July 28, 1907; product, steel castings; annual capacity, single turn, 18,000 tons of open-hearth castings and 4,000 tons of Tropenas castings. One double heating furnace and one 14-inch train of rolls for the manufacture of wheels

added in 1905 and first wheels rolled in May, 1905; product, rolled steel car wheels; annual capacity, 5,000 tons of wheels; rolls temporarily idle. Fuel, natural gas. Works contain a machine shop. W. A. Herron, President; T. H. Bakewell, Vice President and Treasurer; L. W. Frank, Secretary.

Duquesne Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Cochran.—*See page 12.*

Edgar Thomson Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Bessemer.—*See pages 12-13.*

Etna Iron and Tube Works, Spang, Chalfant & Co., Incorporated, Union Bank Building, Pittsburgh. Works at Etna. Manufacturers of skelp iron, wrought iron and steel pipe for water, gas, steam, and oil, and wrought iron and steel boiler tubes. Built in 1828; rolling mill department contains 22 single puddling furnaces, 2 scrap furnaces, one bloom furnace, 11 heating furnaces, 4 trains of rolls, (one 18-inch muck, one 22-inch plate, and one 12 and one 16-inch skelp,) and 3 hammers; product, pipe iron; annual capacity, 90,000 tons. Tube department contains 2 butt-weld and 3 lap-weld furnaces; sizes of pipe, from $\frac{1}{2}$ of an inch to 24 inches; of tubes, from $1\frac{1}{2}$ inches to 13 inches; annual capacity, 100,000 tons. Fuel, natural and manufactured gas and coal. This was the first mill to use natural gas exclusively; it still uses it in some departments. Brand, "Etna." Works contain two machine shops. Henry Chalfant, President; D. B. McClelland, Vice President and Treasurer; A. M. Bell, Assistant Treasurer; W. C. Heath, Secretary.

Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh, Pa. Works at foot of Twelfth st. Open-hearth works built in 1882 and first steel made in August of that year; plant now contains 3 acid open-hearth steel furnaces (two 10 and one 25-gross-ton); product, steel castings; annual capacity, 6,000 tons. Fuel, natural gas. Also makes gray iron and brass castings. A machine shop is connected with the works. Joseph Fawell, President; W. H. McFadden, Vice President and General Manager; William M. Westerman, Secretary; Pennock Hart, Treasurer.

Fort Pitt Malleable Iron Company, McKees Rocks. Built in 1901; three 15-gross-ton acid open-hearth steel furnaces, built in 1901, 1905, and 1906, and 17 annealing furnaces; product, miscellaneous open-hearth malleable castings but steel castings could be made; annual capacity, 15,000 tons of malleable castings. Fuel, natural gas. Frank J. Lanahan, President; Otto F. Felix, Vice President; W. A. Heyl, Secretary; R. J. Davidson, Treasurer.

Fort Pitt Steel Casting Company, McKeesport. Built in 1905-6; one 2-gross-ton modified Bessemer steel converter with one cupola; first steel made June 15, 1906; product, steel castings; an-

nual capacity, 2,400 tons. Fuel, natural gas. C. S. Koch, President and General Manager; William Curry, Vice President; W. L. Curry, Secretary and Treasurer.

General Castings Company, Verona, (a suburb of Pittsburgh.) Built in 1904-5; two 20-gross-ton Smythe acid open-hearth steel furnaces; first steel made April 4, 1905; product, steel castings for railroad and jobbing work; annual capacity, 14,400 tons. Fuel, natural gas. J. H. D. Eagan, President and General Manager; D. C. Eagan, Secretary and Treasurer.

Glassport Works, Pittsburgh Steel Company, Pittsburgh. Works at Glassport.—*See page 168.*

Glendon Rolling Mill, Dilworth, Porter & Co., Limited, Pittsburgh. Built in 1857, partly destroyed by fire in November, 1901, and rebuilt in 1902; 35 heating furnaces, 19 automatic and 21 hand spike machines, and 7 trains of rolls (three 8, one 9, one 16, and two 18-inch); product, steel railroad and boat spikes and tie plates; annual capacity, 65,000 tons of spikes and 50,000 tons of tie plates. Fuel, natural gas and coal. Brands: for spikes, "Dilworth, Porter & Co.;" for tie plates, "Glendon Flange" and "Goldie Claw." Also makes floor plates, chill and mill castings, etc.; annual capacity, 500 tons. A machine shop is connected with the works. Lawrence Dilworth, Chairman; F. C. Stoeltzing, Treasurer; W. F. Schleiter, Secretary and Selling Agent. Selling agents, Joseph M. Gilbert, 35 Wooster st., New York; H. C. McNair, Endicott Building, St. Paul; John G. Miller, 933 Marquette Building, Chicago; Joseph G. Miller, Commonwealth Trust Building, St. Louis; V. A. Moore, Empire Building, Atlanta, Ga.; F. C. Stowell, John Hancock Building, Boston. Representative, William Goldie, German National Bank Building, Pittsburgh.

Hays Station Works, Monongahela Iron and Steel Company, Hays Station, P. and L. E. R. R. and Pennsylvania R. R.—*See page 171.*

Homestead Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Munhall.—*See pages 13-14.*

Howard Axle Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Homestead.—*See page 14.*

Howe, Brown & Co. Works, Crucible Steel Company of America, Pittsburgh. Works at Pittsburgh.—*See page 164.*

Hydraulic Machine Company, McCandless ave. and Allegheny Valley Railway, Pittsburgh. Built in 1890; 2 cupolas for gray iron castings and 4 furnaces for brass castings; open-hearth steel department, added in 1895, now equipped with two 15-gross-ton furnaces (one acid and one basic); first acid open-hearth steel made in July, 1895; basic open-hearth steel not made down to December 31, 1907; product, gray iron, brass, and open-hearth steel castings;

- also all kinds of rolling mill and steel works machinery; annual capacity, 4,000 tons of iron castings, 500 tons of brass castings, and 4,000 tons of acid and 4,000 tons of basic open-hearth castings. Fuel, coal, coke, and natural gas. Henry Aiken, Proprietor.
- Interstate Steel Company, Brackenridge. Built in 1903-4; 6 sheet furnaces, 6 pair furnaces, 10 box annealing furnaces, 6 hot sheet mills, (one 22-inch and five 26-inch,) four 22-inch cold mills, 3 electric traveling cranes, and 8 shears (one rotary circle and seven 126-inch guillotine); first products cold rolled in July, 1903, and first products hot rolled in January, 1904; product, sheets for electric work, stoves, stamping, plating, and nickeling, hardware, shovels, and tack plate; annual capacity, 25,000 tons. Fuel, coal and natural gas. Alfred Hicks, President, R. D. Campbell, Secretary, and H. E. Sheldon, General Manager, Pittsburgh; L. W. Hicks, Treasurer, Leechburg; Julian Burdick, Auditor, Brackenridge.
- La Belle Works, Crucible Steel Company of America, Pittsburgh. Works at Allegheny.—*See pages 164-65.*
- Liggett Spring and Axle Company, Monongahela City. Works at Axleton, opposite Monongahela. Built in 1903-4, utilizing machinery from former works at Beaver ave. and Fayette st., Allegheny; rolling mill not put in operation down to October 1, 1907; other departments started in January, 1904; equipped with about 60 large and small heating furnaces, 26 hammers, (from 500 to 1,000 pounds,) and one 16-inch train of hot rolls; product, buggy and wagon axles and springs; annual capacity, 7,500 tons. Fuel, natural gas. John H. Neuhart, Secretary and Treasurer.
- Lower Union Mills, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Twenty-ninth st., on the Allegheny Valley Railway.—*See page 14.*
- McConway (The) and Torley Company, Forty-eighth st. and A. V. Ry., Pittsburgh. Built in 1901-2 and first open-hearth steel made January 25, 1902; 3 acid furnaces (two 15 and one 20-gross-ton); product, steel car couplers and miscellaneous castings for car and locomotive work; annual capacity, 25,000 tons. Fuel, natural and producer gas. A malleable iron foundry is connected with the works; annual capacity, 15,000 tons. William McConway, President; Stephen C. Mason, Secretary; E. M. Grove, Treasurer. Selling agents, H. C. Buhoup, 204 Great Northern Building, Chicago; I. H. Milliken, Pittsburgh; Latham McMullin, Flood Building, San Francisco.
- McCutcheon Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at 88 Rebecca st., Allegheny.—*See page 15.*
- Mesta Machine Company, Lewis Building, (post-office box 1124,) Pittsburgh, Pa.; branch offices, New York, Philadelphia, Chicago,

- Birmingham, and Montreal, Canada. Works at West Homestead, Pa. Built in 1899 and first steel made November 21, 1899; works now contain 2 acid open-hearth steel furnaces (one 25 and one 35-gross-ton) and 3 annealing furnaces; product, steel rolls and general castings; also machine-moulded gears; annual capacity, 25,000 tons. Fuel, natural gas and coal. A foundry for the production of gray iron castings is connected with the works and is equipped with 6 air furnaces and one 72 and three 84-inch cupolas; annual capacity, 36,000 tons. Principal articles of manufacture: heavy engines of all types, heavy rolling mill machinery, etc. George Mesta, President; Charles J. Mesta, Vice President; J. O. Horning, Treasurer; W. D. Rowan, Secretary and Auditor; F. L. Thompson, Purchasing Agent. Selling agents, John A. Schroeder, 149 Broadway, New York; Shook & Fletcher, Birmingham, Ala.
- Monongahela Works, American Sheet and Tin Plate Company, Pittsburgh. Works on South Fifteenth st.—*See page 59.*
- National Works, Boston Mill, National Tube Company, Pittsburgh. Works at McKeesport.—*See page 37.*
- National Works, Monongahela Steel Works, National Tube Company, Pittsburgh. Works at McKeesport.—*See page 37.*
- National Works, National Mills, National Tube Company, Pittsburgh. Works at McKeesport.—*See page 37.*
- National Works, Republic Mills, National Tube Company, Pittsburgh. Works on Twenty-fifth st., South Side.—*See pages 37-38.*
- Oliver Iron and Steel Company, Pittsburgh; offices, mills, and factories located from Tenth to Fifteenth sts., on the Monongahela river, South Side. Operations began in 1863; 20 single puddling furnaces, 9 heating furnaces, 5 hammers, (one 1,500, one 1,200, and three 1,000-pound,) 4 trains of rolls, (one 8, one 10, one 16, and one 20-inch,) and one continuous combination mill connected with an 11-inch finishing mill; product, bar iron and steel, rounds, squares, flats, and special shapes; part of the steel and iron made is used by the company in the manufacture of finished track bolts, carriage bolts, machine bolts, coach screws, rivets, nuts, washers, hinges, wagon iron hardware, railway car forgings, railway track tools, telegraph and telephone pole equipment, picks and mattocks, and crowbars and wedges; annual capacity, 120,000 tons. Fuel, coal and natural gas, the latter obtained from the company's properties in Washington and Greene counties. John C. Oliver, President; Henry Oliver, First Vice President; Henry B. Lupton, Second Vice President; Ralph Theophilus, Treasurer; Charles E. Black, Secretary and Purchasing Agent.
- Painter Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works on the South Side.—*See page 16.*

Pennsylvania Malleable Company, Farmers Bank Building, Pittsburgh; Philadelphia offices, 101 Arcade Building. Works at McKees Rocks. Malleable iron foundry built in 1898 and first put in operation in 1899; five 15-gross-ton acid Swindell & Smythe open-hearth steel furnaces added in 1903; first open-hearth steel made November 3, 1903; product, car couplers and miscellaneous castings; annual capacity, 40,000 tons. Fuel, natural gas. The malleable foundry is equipped with 30 annealing furnaces and has a daily capacity of 65 tons of castings. W. H. Schoen, President; H. J. Gearhart, Secretary; A. R. Bassett, Treasurer.

Pittsburgh Forge and Iron Company; general offices, corner Tenth st. and Penn ave., Pittsburgh. Works in the Ninth ward, Allegheny. Built in 1864; 38 single puddling furnaces, 14 heating furnaces, 5 trains of rolls, (one 9, one 16, two 20, and one 16-inch vertical,) and 11 steam hammers (three 800-lb., one 1,000-lb., one 2-ton, two 3½-ton, two 4-ton, one 5-ton, and one 7-ton); product, bar iron and steel, splice bars, track bolts, machine bolts, arch bars, links and pins, engine and staybolt iron, hammered steel car and locomotive axles, and marine and locomotive forgings; annual capacity, 36,000 tons of finished rolled products and 24,000 tons of forged products. Fuel, manufactured and natural gas and coal. Brands for rolled products, "Atlas" and "Atlas Special." A machine shop is connected with the works. Calvin Wells, President and Treasurer; F. E. Richardson, Secretary; John H. Barr, Manager. Selling agents, F. B. Buss, Chicago; J. Howard Ewald, St. Louis.

Pittsburgh Steel Foundry, House Building, Pittsburgh. Works at Glassport. Built in 1899 and first steel made in November, 1899; five 20-gross-ton open-hearth steel furnaces (two basic and three acid); product, steel castings for mills, electrical work, mining machinery, locomotive wheel centres and frames, car bolsters, etc.; annual capacity, 60,000 tons. Fuel, natural gas. Stewart Johnston, President; J. M. Lockhart, Vice President; O. S. Pulliam, Acting Secretary; John Bright, Acting Treasurer. Selling agent, H. V. Seth, Philadelphia.

Pittsburgh Works, American Steel Foundries, Chicago. Works, corner Thirty-sixth st. and A. V. Ry., Pittsburgh.—*See pages 126-27.*

Port Vue Mills, McKeesport Tin Plate Company, McKeesport. Works at Port Vue. Built in 1902-3 and first put in operation in March, 1903; 10 sheet, 10 pair, and 2 annealing furnaces and 20 black plate mills (ten 32-inch hot and ten 36-inch cold); product, black plates for tinning and tinplates; annual capacity, 30,000 tons of black plates and 600,000 boxes of tinplates. Fuel, coal in the rolling mill and natural gas in the tinplate works. E. R. Craw-

ford, President; E. P. Douglass, Vice President; H. M. Clark, Secretary; William L. Curry, Treasurer; J. E. Lauck, General Manager. Selling agents, Ely and Williams Company, New York. —See *Tinplate and Terne Plate Works, Part III.*

Rankin Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Rankin Station, Pa.—See page 45.

Refined Iron and Steel Company, Incorporated, Lewis Building, Pittsburgh. Works at Wireton. Built in 1899–1900 and first put in operation July 1, 1900; rebuilt in 1906 and put in operation November 20, 1906; 7 double puddling furnaces, 3 pile furnaces, and 4 trains of rolls (one 22-inch muck, one 9 and one 12-inch finishing, and one 16-inch billet and finishing); product, muck bar, consumed by the company in the manufacture of squares, flats, and rounds from $\frac{1}{2}$ of an inch to $3\frac{1}{2}$ inches; annual capacity, 25,000 tons of muck bar and merchant iron. Fuel, bituminous coal. J. C. DeNoon, President, W. P. Hansell, Vice President, H. F. Gilg, Secretary, and I. N. DeNoon, Treasurer and Purchasing Agent, Pittsburgh. (Formerly operated by the United States Wire and Nail Company; acquired by the present company on March 1, 1906; 42 wire-nail machines now in the works are idle and for sale.)

Sable Iron Works, Zug Iron and Steel Company, post-office box 1053, Pittsburgh. Works at Thirteenth and Etna sts. Original works built in 1845; 22 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, (one 8, one 10, and one 16-inch, one universal mill, one 18-inch bar mill, and one 3-high 20-inch muck train with 3 stands.) Sheet mill, added in 1895, now contains 12 heating furnaces, 7 producer gas furnaces, 7 annealing furnaces, 11 stands of rolls, (2 pair roughing, 6 pair finishing, and 3 pair cold,) and 3 pair of squaring and one pair of doubling shears. An electric plant is connected with both mills and 2 electric cranes are connected with the sheet mill. Product, special irons for use in forging and machine-shop work and railway supplies, including heavy sizes of flats and squares made on universal rolls, high-grade horseshoe bars, black plates for tinning, and steel and iron sheets for corrugating, galvanizing, stamping, expanded metal, and electric work; annual capacity, 22,500 tons of bar iron and 14,000 tons of sheets. A galvanizing plant is connected with the works; annual capacity 6,000 tons. Corrugated sheets are also produced. Fuel, coal, natural gas, and manufactured gas. Brand, "Sable." Charles H. Zug, President; Charles G. Zug, Vice President and General Manager; A. M. Brown, Secretary, Auditor, and Purchasing Agent; Charles H. Reid, Treasurer and General Sales Manager. Eastern selling agents, Horne Brothers, 95 Milk

- st., Boston. (Formerly operated by Zug & Co., Limited; acquired by the Zug Iron and Steel Company on May 1, 1906.)
- Schoen Steel Wheel Company, Pittsburgh; Philadelphia offices, 100 Arcade Building. Works at McKees Rocks. Built in 1903 and first put in operation in November, 1903; 10 heating furnaces, 2 special mills for rolling car wheels from steel slabs, and 10 large hydraulic forging presses; product, pressed and rolled steel wheels for engine tenders and passenger, freight, steam, and electric cars; annual capacity, 90,000 tons. Fuel, natural and producer gas and bituminous coal. Brand, "Pressed and Rolled Steel" wheels. Adding four 35-gross-ton basic open-hearth furnaces. Charles T. Schoen, President; M. R. Jackson, Vice President and General Manager; W. M. Johnson, Second Vice President and Manager of Sales; George T. Hildebrand, Secretary; Thomas G. D. Bell, Treasurer. Sales offices, Farmers Bank Building, Pittsburgh; Bowling Green Building, New York; Fisher Building, Chicago.
- Shoenberger Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Fifteenth st., Pittsburgh.—*See page 45.*
- Singer, Nimick & Co. Works, Crucible Steel Company of America, Pittsburgh. Works in the Thirty-fourth ward.—*See page 165.*
- Soho Department, Jones and Laughlin Steel Company, Pittsburgh. Works on Second ave., near Brady st.—*See pages 158-59.*
- Sterling Steel Foundry Company, Frick Building, Pittsburgh. Works at Braddock. Built in 1902 and first put in operation in October, 1902; two 20-gross-ton Swindell acid open-hearth steel furnaces; product, steel castings; annual capacity, 25,000 tons. Fuel, natural gas. S. J. Wainwright, Jr., President; H. E. Wainwright, Jr., Secretary; Uriah Tinker, Treasurer and Manager.
- Superior Steel Company, Pittsburgh. Works at Carnegie. Built in 1892 and first put in operation January 3, 1893; 5 heating furnaces, 8 annealing furnaces, 4 trains of 3-high hot rolls, (one 10, two 14, and one 20-inch,) and 5 pair of 8, 24 pair of 10, and 6 pair of 14-inch cold rolls; product, hot and cold rolled strip steel; annual capacity, 35,000 tons. Fuel, natural gas and coal. Brand, "Superior." James H. Hammond, President; E. W. Harrison, Vice President; Joseph F. Hedges, Secretary and Treasurer.
- Union Steel Casting Company, Sixty-first st. and A. V. Ry., Pittsburgh. Built in 1899 and first steel made July 10, 1899; two 25-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, single turn, 18,000 tons. Fuel, natural gas. C. C. Smith, President; G. W. Smith and S. H. Church, Vice Presidents; J. P. Allen, Secretary; G. W. Eisenbeis, Treasurer.
- United States Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Demmler, (McKeesport.)—*See page 61.*

- Upper Union Mills, Carnegie Steel Company (of New Jersey), Pittsburgh. Works on Thirty-third st., Pittsburgh.—*See page 17.*
- Velte Foundry and Machine Company, Home street and Allegheny Valley Railway, Pittsburgh. Gray iron foundry built in 1902; equipped with one cupola; product, castings for machinery, gas engines, etc.; annual capacity, 6,500 tons. One 2-gross-ton modified Tropenas converter and one cupola added in 1905-6; first blow made February 28, 1906; product, steel castings up to 2,000 pounds in weight; annual capacity, 2,500 tons. Fuel, coke. Works contain a machine shop. William Velte, President; William McC. Reynolds, Vice President; M. R. Velte, Secretary and Treasurer.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg. Built in 1846; 40 single puddling furnaces, 8 regenerative heating furnaces, one 4-ton hammer, and 4 trains of rolls (one 15, one 18, one 3-high 19, and one 24-inch); product, bar, boiler, sheet, tank, and skelp iron and steel; annual capacity, 100,000 tons of rolled products. Fuel, natural gas and coal. Brand, "Vesuvius." Works contain a machine shop. John Moorhead, Jr., President; E. A. Hughes, Secretary and Treasurer.
- Vulcan Forge and Iron Works, Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks. Forge built in 1877; rolling mill built in 1882 and enlarged in 1906; 38 single puddling and busheling furnaces, 5 forge fires, 2 upsetting machines, 9 heating furnaces, one rotary squeezer, 5 trains of rolls, (one 9, one 12, two 16, and one 23-inch,) and 4 hammers; product, rolled bar iron, bands, bridge iron, soft steel in bars, and hexagon, grooved, and angle iron and steel; annual capacity, 60,000 tons of finished rolled iron and steel. Fuel, natural gas and coal. Brands, "Vulcan," "Vulcan XX," and "Vulcan Special." Works contain a machine shop. J. M. Lockhart, President; W. M. McKelvy, Vice President; T. J. Gillespie, Secretary and Treasurer; J. M. Gillespie, General Sales Manager and Purchasing Agent.
- Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Works, cor. Tenth st. and Duquesne way. Built in 1825 and incorporated in 1891. J. Stuart Brown, President and Treasurer; Henry Graham Brown, Vice President; James Neale, Secretary.—*Decline to give a detailed description of their works.*
- Wood's Works, American Sheet and Tin Plate Company, Pittsburgh. Works at McKeesport.—*See page 62.*

PROJECTED ROLLING MILLS AND STEEL WORKS.

- Donner, (Percy E.,) Frick Building Annex, Pittsburgh. Contemplates erecting works in the Pittsburgh District, to be equipped with twelve 50-gross-ton basic open-hearth steel furnaces, a bloom-

ing mill, a combination bar and plate mill capable of rolling sheet bars and plates up to 36 inches wide, and a continuous sheet mill to roll No. 24 gauge sheets and thicker. A galvanizing department will be connected with the works.

Pittsburgh Spring and Steel Company, Farmers Bank Building, Pittsburgh; branch offices, Fisher Building, Chicago; Pioneer Press Building, St. Paul; 12 John st., New York; Granite Building, St. Louis; and Alaska Building, Seattle. Now manufactures at Pittsburgh steel springs of all kinds from purchased material; contemplates adding a department for the manufacture of hot-rolled steel for its own use. D. C. Noble, President and Treasurer; T. H. Given and L. C. Noble, Vice Presidents; W. H. Gardner, Assistant Treasurer; S. F. Krauth, Assistant Secretary.

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 66 completed and 2 projected. Of these 6 make Bessemer steel, one makes modified Bessemer steel, and 2 make Tropenas steel; 27 can make open-hearth steel, one open-hearth plant is being built, and one open-hearth plant is projected; 10 make crucible steel; and 4 make blister or cemented steel.

SHENANGO VALLEY AND BEAVER COUNTY.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Beaver, Lawrence, and Mercer Counties.

COKE FURNACES—21 COMPLETED, 4 BUILDING, AND 1 PROJECTED.

Alice Furnace, The Youngstown Sheet and Tube Company, Youngstown, Ohio. One coke furnace at Sharpsville, Pa.—*See page 180.*

Aliquippa Works, Jones and Laughlin Steel Company, Pittsburgh. Three building coke furnaces near Aliquippa; also one projected coke furnace.—*See page 158.*

Atlantic Furnace, Republic Iron and Steel Company, Pittsburgh. Furnace at New Castle. One stack; fuel, coke. (Formerly operated by the Atlantic Iron and Steel Company; but controlled by the Republic Iron and Steel Company.)—*See page 93.*

Claire Furnace, Claire Furnace Company, Sharpsville; branch offices with M. A. Hanna & Co., Cleveland. One stack, 75 x 16, built in 1869 and rebuilt in 1886, 1893, 1897, 1902, and 1906; four fire-brick stoves; fuel, coke; ore, Lake Superior; product, Bessemer, malleable, and foundry pig iron; annual capacity, 85,000 tons. L. C. Hanna, President, and H. M. Hanna, Jr., Secretary, Cleveland; Leon J. Robbins, Treasurer, and J. W. Robbins, General Manager, Sharpsville. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1907.*

Ella Furnace, Pickands, Mather & Co., Cleveland. Furnace at West

- Middlesex, Pa. One stack, 70 x 14½, built and blown in in 1882; remodeled in 1892 and 1899; five Wheeler pipe hot-blast stoves; fuel, coke; ore, Lake Superior; product, Bessemer, basic, foundry, and malleable pig iron; annual capacity, 80,000 tons. Brands, "Ella Foundry," "Ella Strong Foundry," and "Ella Malleable." H. S. Braman, Manager. Selling agents, Pickands, Mather & Co., Cleveland.—*Active in 1907.*
- Fannie Furnace, United Iron and Steel Company, Pittsburgh. Furnace at West Middlesex. One stack; fuel, coke.—*See page 175.*
- Hall Furnace, Republic Iron and Steel Company, Pittsburgh. Furnace at Sharon. One stack; fuel, coke.—*See page 93.*
- Midland Furnace No. 2, Midland Steel Company, German National Bank Building, Pittsburgh. Furnace at Midland. One stack, 85 x 21; construction commenced September 20, 1905; completed and blown in September 6, 1906; four McClure 3-pass stoves, each 100 x 21; fuel, coke; ore, Lake Superior from the company's mines; product, Bessemer, basic, and foundry pig iron; annual capacity, 150,000 tons. Company has 240 coke ovens with an annual capacity of 150,000 net tons. H. C. Fownes, President; J. Ramsey Speer, Vice President; William C. Fownes, Jr., Secretary; Charles McKnight, Treasurer.—*Active in 1907.*
- New Castle Furnaces, Carnegie Steel Company (of New Jersey); Pittsburgh. Four furnaces at New Castle; fuel, coke.—*See page 9.*
- Sharon Furnace, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnace at Sharon. One stack; fuel, coke.—*See page 10.*
- Sharpsville Furnace, The Sharpsville Furnace Company, First National Bank Building, Chicago. Furnace at Sharpsville, Pa. One stack, built in 1847 and torn down in 1882; new iron stack, 65 x 15, blown in October 15, 1882; remodeled in 1897; three iron stoves; fuel, coke; ores, Lake Superior and magnetic from the Benson mines in St. Lawrence county, N. Y.; product, Bessemer and malleable Bessemer pig iron; annual capacity, 55,000 tons. Brand, "Sharpsville." Alexis W. Thompson, President, John C. Eden, Vice President, and Charles Hart, Secretary, Chicago; R. W. Coats, General Manager, Sharpsville.—*Active in 1907.*
- Shenango Furnaces, Nos. 1, 2, 3, and 4, The Shenango Furnace Company, Pittsburgh. Furnaces at Sharpsville. Four completed stacks and one stack building; fuel, coke. (Nos. 1, 2, and 3 formerly operated by the Shenango Furnace Company; No. 4 formerly operated by Perkins & Co., Limited, and known as Mabel Furnace.)—*See pages 173-74.*
- South Sharon Furnaces, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Three coke furnaces at South Sharon. (Owned by the Union Steel Company.)—*See pages 10 and 70-71.*

Stewart Furnace, Stewart Iron Company, Limited, Sharon. One stack, 75 x 17, built in 1872, enlarged in 1883, and rebuilt in 1892; four Cowper-Kennedy fire-brick stoves, each 70 x 18; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, low-phosphorus, foundry, basic, and forge pig iron; annual capacity, 96,000 tons. Brand, "Stewart." A plant for the manufacture of cement from furnace slag is connected with the furnace; annual capacity, 150,000 barrels of 340 pounds each. The company also operates 155 coke ovens at Uniontown, Pa., with an annual capacity of 90,000 net tons.—*Active in 1907. See Stewart Iron Works, page 308.*

Number of coke furnaces in the Shenango Valley and Beaver County: 21 completed, 4 building, and one projected.

ROLLING MILLS AND STEEL WORKS—28 COMPLETED, 1
BUILDING, AND 2 PROJECTED.

Aliquippa Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Aliquippa.—*See page 162.*

Ambridge Plant, American Bridge Company, Pittsburgh. Works at Ambridge.—*See page 66.*

Colonial Steel Company, Keystone Building, Pittsburgh; branch offices, New York, Boston, and Chicago. Works at Colona; telegraph address, Monaca. Built in 1901-2 and enlarged in 1906. Crucible steel department contains seven 24-pot and two 36-pot Siemens crucible steel-melting furnaces with 240 pots; first crucible steel made in March, 1902. Open-hearth steel department added in 1906 and first steel made August 8, 1906; 2 stationary basic open-hearth steel furnaces (one 25 and one 35-gross-ton) and 6 soaking pits. Rolling mill and forge department, built in 1901-2, now contains 12 single puddling furnaces, one squeezer, 30 heating furnaces, 12 gas producers, 4 annealing furnaces, 3 forge fires, 9 hammers, (three 600-lb., one 1,000-lb., one 1,250-lb., one 1,500-lb., one 2,000-lb., one 6,000-lb., and one 12,000-lb.) and 9 trains of rolls (one 2-high 28-inch reversing blooming mill, one 3-high 18-inch muck mill, one 9, one 12, and one 16-inch bar mill, one 28-inch and two 18-inch saw plate mills, and one 22-inch plow plate mill); first products forged in February, 1902, and first products rolled in May, 1902. Product, crucible and open-hearth steel ingots, crucible steel bars, sheets, plates, circular saw plates, forgings, and crucible and open-hearth merchant steel; annual capacity, 17,000 tons of crucible steel ingots, 30,000 tons of open-hearth steel ingots, and 25,000 tons of finished rolled and forged products. Fuel, coal and natural gas. Brands, "Colonial," "Red Star," and "Victor." James W. Brown, President; T. H. Childs,

- Vice President and Treasurer; Charles M. Brown, Secretary and General Sales Manager. Selling agents, Bassett-Presley Company, Cleveland; Einwechter & Wyeth, Philadelphia; Mine and Smelter Supply Company, Denver, Salt Lake City, and City of Mexico.
- Damascus Crucible Steel Casting Company, New Brighton. Built in 1900-1 and first put in operation February 5, 1901; 2 heating furnaces and one 24-pot crucible steel-melting furnace with 4 steel-melting holes; product, crucible steel castings; annual capacity, single turn, 750 tons. Fuel, bituminous coal and manufactured gas. One 3,000-lb. experimental acid open-hearth steel stationary furnace partly erected in 1906; work stopped in the same year; product, to be castings; estimated annual capacity, 800 tons; fuel to be used, producer gas. Charles Capper, President, General Manager, General Sales Manager, and Purchasing Agent; C. H. Capper, Secretary and Treasurer. (Formerly operated by the Damascus Steel Company; acquired by the Damascus Crucible Steel Casting Company on June 10, 1903.)
- Ellwood Works, (Factory B,) Shelby Steel Tube Company, Pittsburgh. Works at Ellwood City.—*See page 40.*
- Greenville Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Greenville.—*See page 13.*
- Greenville Works, (Factory C,) Shelby Steel Tube Company, Pittsburgh. Works at Greenville.—*See page 40.*
- Keystone Axle Works, Pittsburgh Axle Company, Pittsburgh Life Building, Pittsburgh. Works at Morado, (post-office address, Beaver Falls.) Built in 1897 and first put in operation in November, 1898; one continuous heating furnace and 2 trains of rolls (one 48 x 96-inch and one 26 x 68-inch); rolls run in a housing fitted with dies; product, circumferentially rolled car axles; annual capacity, 15,000 tons. Fuel, coal. Frank B. Robinson, President; J. T. Rowley, Vice President and General Manager; F. H. Kuhns, Secretary and Treasurer. (Formerly owned by W. A. Crist; acquired by the present owners on July 24, 1907.)
- Keystone Driller Company, Incorporated, Beaver Falls; branch offices, 170 Broadway, New York, and Platteville, Wisconsin. Company organized in 1882; now manufactures portable well-drilling and prospecting machines. Commenced building in July, 1907, one 2-gross-ton modified Bessemer converter for the manufacture of steel castings for its own use and 2 cupolas. Fuel to be used, coke and oil. Gray iron and brass castings will also be made. J. D. McAnlis, President; H. H. George, Vice President; R. M. Downie, Secretary and General Manager; R. G. Forbes, Treasurer and Purchasing Agent.
- Mercer Works, American Sheet and Tin Plate Company, operators,

- Pittsburgh. Works at South Sharon. (Formerly called the South Sharon Sheet Mill; later the Sharon Works; owned by the Union Steel Company.)—*See pages 59 and 71.*
- Myers (The H. M.) Company Plant, Ames Shovel and Tool Company, Boston. Works at Beaver Falls, Pa.—*See page 178.*
- New Castle Forge and Bolt Company, New Castle. Rolling mill added to a bolt, nut, and rivet plant in 1904; plant now contains one 26-inch plate train, 48 regenerative gas heating furnaces, 25 bolt machines, 35 hammers, (one 60-lb., four 80-lb., one 200-lb., one 300-lb., two 800-lb., one 1,000-lb., one 2,000-lb., and 24 chain,) and a large number of bulldozers, presses, and other forging machines; product of the rolling mill, light plates for the use of the company; also manufactures forgings, chains, bolts, nuts, rivets, and heavy hardware; annual capacity, 4,000 tons of light plates and 24,000 tons of chains, bolts, nuts, forgings, and other finished products. Fuel, oil and producer gas. C. J. Kirk, President; E. W. Beadel, Vice President; E. E. Whittaker, Treasurer; Paul A. McBride, Secretary. Selling agents, the Herr-Bishop Supply Company, Denver, Colorado; Osgood & Howell, San Francisco, California.
- New Castle Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at New Castle.—*See page 15.*
- New Castle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*See page 59.*
- Pittsburgh Seamless Tube Company, Beaver Falls. Works at Morado Station, on the Pittsburgh, Fort Wayne, and Chicago Railway. Built in 1899 and first put in operation December 20, 1899; 3 heating furnaces, one piercing mill, and 6 stands of rolls; product, steel blanks, used in the manufacture of seamless-drawn tubes; annual capacity, 9,000 tons of blanks and 3,300,000 feet of tubes. Fuel, coal. George H. Blaxter, President; D. A. Rees, Vice President; F. J. Cluley, Secretary and Treasurer.
- Russell (J. C.) Shovel Company, Times Building, Pittsburgh. Works at Aliquippa. Built in 1893 and put in operation the same year; 3 heating furnaces and one train of rolls for reducing billets into shovel blanks; product, shovel blanks, all consumed by the company in its shovel works; annual capacity, 1,700 tons or 50,000 dozen of blanks. Fuel, coal and natural gas. A small machine shop is connected with the works. J. L. Cooper, President; E. H. King, Secretary and Treasurer.
- Sharon Foundry Company, Sharon. Works at Wheatland. One 20-gross-ton acid Laughlin open-hearth steel furnace and 2 Laughlin gas producers built in 1905; first steel made December 18, 1905; product, steel castings; annual capacity, 6,000 tons. Fuel,

producer gas. One 20-gross-ton acid open-hearth steel furnace is to be added. W. W. Shilling, President; Thomas Kennedy, Secretary, Treasurer, and Manager.

Sharon Steel Hoop Company, Sharon. Built in 1900-1 and first put in operation March 15, 1901; 4 ingot and 3 billet reheating furnaces, 5 trains of rolls, (one 12 and one 22-inch 3-high bar, one 10-inch continuous roughing, and one 8 and one 9-inch 3-high hoop,) and 7 cranes; product, billets, sheet bars, hoops, bands, and cotton-ties; annual capacity, 90,000 tons of billets and sheet bars and 80,000 tons of hoops, bands, and cotton-ties. Open-hearth steel department, added in 1902-3, now contains five 35-gross-ton Swindell stationary furnaces (4 acid and one basic); first acid steel made April 24, 1903, and first basic steel made February 8, 1905; product, ingots; annual capacity, 70,000 tons of acid and 20,000 tons of basic ingots. Fuel, producer gas in all departments. A galvanizing department with 2 pots is connected with the plant; product, hoops and bands; annual capacity, 6,000 tons. Has a machine shop. Morris Bachman, President, R. A. Winterburn, Secretary, and E. J. Anglin, Treasurer, Sharon; O. A. Blackburn, Vice President and Purchasing Agent, Union Bank Building, Pittsburgh.

Sharon Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Sharon.—*See page 16.*

Sharon Works, American Steel Foundries, Chicago. Works at Sharon, Pa.—*See page 127.*

Sharon Works, The National Malleable Castings Company, Cleveland. Works at Sharon, Pa.—*See page 176.*

Shenango Iron and Steel Company, Lewis Building, Pittsburgh; branch offices, Chicago, Buffalo, and Cleveland. Works at Wheatland. Built in 1872 to roll rails; rebuilt in 1906; 15 single puddling furnaces, 2 pile furnaces, 5 heating furnaces, one squeezer, and 3 trains of rolls (one 3-high 21-inch muck, one 3-high 10-inch finishing with one set of 14-inch roughing rolls, and one 3-high 18-inch finishing); product, muck bar and refined bar iron; annual capacity, 25,000 tons of muck bar and 40,000 tons of bar iron. Fuel, bituminous coal. John C. Bole, President; Henry A. Ross, Vice President and Secretary; Andrew W. Herron, Treasurer. (Formerly called the Wheatland Rolling Mill.)

Shenango Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*See page 61.*

South Sharon Steel Works, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Works at South Sharon. (Formerly called the South Sharon Works; owned by the Union Steel Company.)—*See pages 16 and 72.*

South Sharon Works, American Sheet and Tin Plate Company, operators, Pittsburgh. Works at South Sharon. (Formerly called the Sharon Works; owned by the Sharon Tin Plate Company; controlled by the Union Steel Company and the American Sheet and Tin Plate Company.)—*See pages 61, 72, and 75-76.*

South Sharon Works, American Steel and Wire Company of New Jersey, operators, Cleveland. Works at South Sharon, Pa. (Formerly called the Sharon Works; owned by the Union Steel Company.)—*See pages 45-46 and 72.*

Stewart Iron Works, Stewart Iron Company, Limited, (post-office box 13,) Sharon. Built in 1870; 9 double puddling furnaces, one heating furnace, 2 hammers, (2½-ton and 5-ton,) and 2 trains of 3-high 18-inch rolls; product, muck bar, "B B" low-phosphorus bars, and hammered blooms for making crucible and open-hearth steel; annual capacity, 11,600 tons of either rolled or forged products. Fuel, coal. Brand, "Stewart." Fayette Brown, Chairman, Harvey H. Brown, Treasurer and Selling Agent, and D. B. Chambers, Secretary, Perry-Payne Building, Cleveland.—*See Stewart Furnace, page 304.*

Vulcan Crucible Steel Company, Aliquippa. Partly built in 1901 by the Kidd Brothers and Burgher Steel Company and completed in 1902 by the Vulcan Crucible Steel Company; makes crucible and open-hearth steel rolled and forged products; first crucible steel made in March, 1902, first open-hearth steel made June 29, 1903, and first products rolled in April, 1903. John Caldwell, President; Samuel G. Stafford, Vice President; W. A. Campbell, Secretary and Treasurer.—*Declines to give a detailed description of its plant.*

Wilkes Rolling Mill, Wilkes Rolling Mill Company, Sharon. Built in 1891 and first put in operation in 1892; 6 double puddling furnaces and 2 trains of rolls (one 24 x 38-inch sheet, hot, and one 22 x 38-inch cold); product, muck bar, bar iron, and iron and steel sheets; annual capacity, 2,500 tons of sheets and 6,000 tons of other rolled products. Fuel, coal. Brand, "Wilkes." William B. Foxall, President; Samuel Wilkes, Vice President; M. Foxall, Secretary and Treasurer; William B. Wilkes, General Manager.

PROJECTED ROLLING MILLS AND STEEL WORKS.

Aliquippa Works, Jones and Laughlin Steel Company, Pittsburgh. Contemplates erecting near Aliquippa a basic open-hearth steel plant, a metal mixer, and a blooming mill.—*See page 159.*

Kidd Brothers and Burgher Steel Wire Company, Aliquippa. Now manufactures polished drill rods; proposes to add to its works one crucible steel-melting furnace with 30 pots, one 10-gross-ton acid open-hearth steel furnace, and 2 hot mills (one 10 and one 16-inch)

for the manufacture of wire rods. R. Burgher, President and Manager; W. J. H. Flinn, Vice President; J. Burgher, Secretary; C. R. Burgher, Treasurer.

Number of rolling mills and steel works in the Shenango Valley and Beaver County: 28 completed, one building, and 2 projected. Of these one makes Bessemer steel and one modified Bessemer plant is being built; 10 make open-hearth steel, one has a partly built open-hearth plant, and 2 open-hearth plants are projected; and 4 make crucible steel and one crucible plant is projected.

WESTERN PENNSYLVANIA DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Western Pennsylvania, except Allegheny, Mercer, Lawrence, and Beaver Counties.

COKE FURNACES—20 COMPLETED AND 1 BUILDING.

Adrian Furnace, Adrian Furnace Company, lessee, Dubois. One stack, 80 x 19, built in 1902-3 and first blown in August 10, 1903; four Julian Kennedy stoves, each 80 x 22; fuel, Reynolds-ville coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 90,000 tons. Brand, "Adrian." Thomas W. Kennedy, President and General Manager; Lucius W. Robinson, Vice President; George H. Clune, Treasurer; F. G. St. Clair, Secretary and Assistant Treasurer; J. G. Miller, General Sales Agent. (Owned and formerly operated by the Rochester and Pittsburgh Coal and Iron Company; leased by the Adrian Furnace Company on November 1, 1904.)—*Active in 1907.*

Cambria Plant, Cambria Steel Company, Philadelphia. Furnaces at Johnstown. Six stacks; fuel, coke.—*See page 154.*

Donora Furnaces, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Furnaces at Donora. Two stacks; fuel, coke. (Owned by the Union Steel Company.)—*See pages 7 and 70.*

Dunbar Furnaces, Dunbar Furnace Company, Dunbar. Two stacks: Furnace No. 1, 80 x 19½, built in 1790 and rebuilt in 1870, 1876, 1880, and 1900; four Whitwell-Roberts stoves, two 92 x 18, one 76 x 22, and one 75 x 18. Furnace No. 2, 80 x 17, first put in blast in May, 1880, remodeled in 1896-7, and rebuilt in 1905-6; three Whitwell-Roberts stoves, each 92 x 18. Fuel, Connellsville coke; ores, Lake Superior specular and soft; product, mill, foundry, basic, Bessemer, car-wheel, and malleable pig iron; total annual capacity, 150,000 tons. Equipped with one pig-iron casting machine. A plant for the manufacture of silica sand is connected with the furnaces; annual capacity, 220,000 tons. Also 110 active Semet-Solvay by-product and 250 idle bee-hive coke ovens; annual capacity, 150,000 net tons. Walter C. Harris,

President, Reginald Palmer, Treasurer, and Stuart B. Marshall, Assistant General Manager, Dunbar; William M. Kitzmiller, Secretary, Bullitt Building, Philadelphia. General Manager and general sales agents, L. & R. Wister & Co., Bullitt Building, Philadelphia, and Frick Building, Pittsburgh.—*Both active in 1907.*

Emporium Furnace, Emporium Iron Company, lessee, Emporium. One stack, 75 x 16, built in 1887-8 and blown in in November, 1888; three Siemens-Cowper stoves, each 70 x 18; fuel, coke; ore, brown hematite; product, foundry, foundry forge, gray forge, and high-silicon pig iron; annual capacity, 45,000 tons. Brand, "Emporium." The company also operates 100 bee-hive coke ovens; annual capacity, 40,000 net tons. Andrew Brady, President; E. D. White, Secretary. Selling agents, Crocker Brothers, 99 John st., New York. (Owned by the Sinnemahoning Iron and Coal Company.)—*Active in 1907.*

Franklin Plant, Cambria Steel Company, Philadelphia. Furnaces at Franklin. Two stacks; fuel, coke.—*See page 154.*

Josephine Furnace, Josephine Furnace and Coke Company, Perry-Payne Building, Cleveland. Furnace at Josephine, Pa. One stack, 80 x 20; construction commenced April 1, 1906; completed and blown in January 14, 1907; first cast made January 21, 1907; four hot-blast stoves; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and basic pig iron; annual capacity, 140,000 tons. Brand, "Josephine." Proposes to build 400 coke ovens. James Corrigan, President; Price McKinney, Vice President; J. E. Ferris, Secretary; E. S. Burke, Jr., Treasurer; Amos E. Gillespie, Superintendent. Selling agents, Corrigan, McKinney & Co., Cleveland.—*Active in 1907. New furnace, 80 x 20, building.*

Perry Furnace No. 1, Perry Iron Company, Erie. One stack, 75 x 17; construction commenced July 25, 1906; completed and blown in June 16, 1907; three McClure stoves, each 70 x 21; fuel, coke; ore, Lake Superior; product, foundry, malleable, and Bessemer pig iron; estimated annual capacity, 100,000 tons. Brand, "Perry." T. S. Clark, President; E. H. Williams, Vice President and General Manager; H. N. Fleming, Secretary; M. L. Mozier, Treasurer. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1907.*

Punxy Furnace, Punxsutawney Iron Company, Punxsutawney. One stack, 80 x 18, built in 1896-7 and blown in September 29, 1897; four 80 x 18 Kennedy centre-combustion stoves; fuel, Adrian coke; ore, Lake Superior hematite; product, foundry and forge pig iron; annual capacity, 75,000 tons. Brand, "Punxy." William A. Rogers, President, and J. G. Munro, Treasurer, Erie County Bank Building, Buffalo, New York; Adrian Iselin, Jr., Vice

President, New York City; E. C. McKibbin, Secretary, and John H. Kennedy, General Manager, Punxsutawney. Selling agents, Rogers, Brown & Co., New York, Buffalo, Philadelphia, Pittsburgh, and branch houses.—*Active in 1907.*

Rebecca Furnaces, Kittanning Iron and Steel Manufacturing Company, Farmers Bank Building, Pittsburgh. Furnaces at Kittanning. Two stacks: one 65 x 14½, put in operation June 20, 1880; four McClure stoves, three 65 x 18 and one 80 x 20; annual capacity, 55,000 tons. Another, 80 x 18; construction commenced in November, 1906; completed but will not be blown in until 1908; stoves above described will be used in operating this furnace; annual capacity, 100,000 tons. Fuel, coke; ore, Lake Superior; product, gray forge and foundry pig iron. Brand, "Rebecca."—*One active in 1907. When the new furnace is blown in the old furnace will be dismantled. See Rolling Mills, page 315.*

Scottdale Furnace, Scottdale Furnace Company, lessee, Scottdale; general offices, Perry-Payne Building, Cleveland. One stack, 73 x 17, built in 1872-3 and put in blast October 14, 1873; one Oldman stove, 80 x 20, and three Foote fire-brick stoves, each 75 x 19; fuel, Connellsville coke; ore, Lake Superior from the company's mines; product, Bessemer, malleable, forge, and foundry pig iron; annual capacity, 95,000 tons. Brand, "Scottdale." James Corrigan, President; Price McKinney, Vice President; J. E. Ferris, Secretary and Treasurer; W. H. Everhart, Superintendent. Selling agents, Corrigan, McKinney & Co., Cleveland and Pittsburgh. (Formerly operated under lease by Corrigan, McKinney & Co.; owned by the United States Cast Iron Pipe and Foundry Company.)—*Active in 1907.*

Number of coke furnaces in Western Pennsylvania outside of Allegheny County, the Shenango Valley, and Beaver County: 20, completed stacks and one stack building.

ROLLING MILLS AND STEEL WORKS—49.

Alcania (The) Company, 503 Murtland Building, Pittsburgh. Works at Avonmore. Built in 1899 and first put in operation September 12, 1899; one bar heating furnace, 3 sheet and pair furnaces, one 2-high bar mill, three 26-inch hot mills, and three 22-inch cold mills; product, black plates for tinning; annual capacity, 7,500 tons. Fuel, bituminous coal. Brand, "Avon." W. H. R. Hilliard, President; M. M. Garland, Vice President; Oliver Wylie, Secretary and Treasurer; William C. Weichsel, Manager.—*See Tinplate and Terne Plate Works, Part III.*

American Duplex Steel Company, 715 Park Row Building, New York. Works at Bradford, Pa. Built in 1903-4; one special ba-

sic 20-gross-ton semi-open-hearth steel furnace and 2 patented converting annealing furnaces; product, "Duplex Steel" castings and malleable iron castings; specialties, connecting rods, gear wheels, oil-well supply castings, etc.; first castings made June 1, 1904; annual capacity, 5,000 tons of "Duplex Steel" and malleable iron castings. Fuel, natural gas. John C. Williams, President; John W. Weed, Treasurer; A. J. Paris, Jr., Secretary. Braeburn Steel Company, Braeburn; Chicago offices, 124 West Lake st. Built in 1897 and first put in operation in October of that year; one continuous regenerative and 7 Siemens heating furnaces, 2 trains of rolls, (one 10 and one 14-inch bar,) and 7 hammers (one 250-lb., one 500-lb., two 1,000-lb., two 1,500-lb., and one 3-ton); 2 Siemens crucible steel-melting furnaces (one 24-pot and one 36-pot) with an annual capacity of 4,000 tons of ingots; first crucible steel made in November, 1897; product, bar and tool steel; annual capacity, 15,000 tons of rolled and forged products. Fuel, natural and manufactured gas. Brands, "B," "BS," "SBS," "HB," and "BT." A small machine shop for the use of the company is connected with the works. William Metcalf, President; Charles Metcalf, Secretary and Treasurer; George H. Neilson, Manager. Selling agents, Cann & Saul, 516 Commerce st., Philadelphia, and 47 Market st., Hartford, Conn.; John Copeland, 421 American National Bank Building, St. Paul, Minn.; Lindsley & Eckliff, 48 Shelby st., Detroit; Eccles and Smith Company, 526 Mission st., San Francisco; S. B. Hicks & Sons, 216 Third ave. south, Seattle, Washington.

Burns Uniform Steel and Metallic Works, Latrobe, Pa. Built in 1904-5; one 48-pot crucible steel-melting furnace; first steel made February 7, 1905; product, ingots; annual capacity, 3,000 tons. Equipped with 3 hammers (500-lb., 1,100-lb., and 2,500-lb.,) and 3 heating furnaces; product, all kinds of tool steel; first hammered products made March 9, 1905; annual capacity, 500 tons. Fuel, natural gas. James T. Hughes, Trustee, Latrobe.—*Idle and for sale.*

Cambria Plant, Cambria Steel Company, Philadelphia. Works at Johnstown.—*See pages 154-55.*

Canonsburg Steel and Iron Works, Canonsburg. Built in 1882; 6 sheet furnaces, 6 pair furnaces, 5 annealing furnaces, one hammer, one 3-high 12-inch sheet bar train, 6 hot sheet mills, (one 26 x 44, one 26 x 42, one 26 x 36, one 26 x 32, and two 25 x 30-inch,) and 6 cold mills (one 22 x 46, one 22 x 44, two 22 x 40, and two 22 x 32); product, steel and iron sheets for stamping, enameling, deep drawing, tinning, galvanizing, japanning, and stove and range work, etc.; annual capacity, 20,000 tons. Fuel, natural gas

- John F. Budke, President and General Manager; John M. Watson, Vice President and Business Manager; William H. Paxton, Treasurer; George W. Retberg, Secretary. Sales made by the company. Chilled Roll Foundry Company Department, United Engineering and Foundry Company, Pittsburgh.—*See page 177.*
- Clearfield Steel and Iron Company, Commonwealth Building, Pittsburgh. Works at Hyde, Pa.; telegraph address, Clearfield. Built in 1903 and first put in operation June 22, 1903; 4 double and 12 single puddling furnaces, one continuous and 2 reverberatory heating furnaces, and 4 trains of rolls (one 3-high 22-inch puddle, one 3-high 14-inch roughing, one 9-inch finishing, and one 18-inch rail); product, muck bar, skelp, bar iron, and iron and steel rails; annual capacity, 15,000 tons of muck bar, 18,000 tons of skelp or 15,000 tons of bar iron, and 20,000 tons of rails. Fuel, bituminous coal. Brand, "Clearfield." Charles Hyde, President; Frederick Kennedy, Secretary.—*A part of these works is leased by the A. M. Byers Company. See page 170.*
- Cyclops Steel Works, Titusville. Built in 1879 and rebuilt in 1884; 2 single puddling and 7 heating furnaces, one 16-inch train of rolls, and 8 hammers; six 6-pot crucible steel-melting holes with an annual capacity of 2,660 tons of ingots; product, special tool steel and extra refined hammered iron; annual capacity, 1,350 tons of hammered iron. Fuel, natural gas and coal. Charles Burgess, Proprietor; Walter Bould, Assistant Manager.
- Donora Steel Works, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Works at Donora. (Owned by the Union Steel Company.)—*See pages 11-12 and 71.*
- Donora Works, American Steel and Wire Company of New Jersey, operators, Cleveland. Works at Donora. (Owned by the Union Steel Company.)—*See pages 44 and 71.*
- Fischer Foundry and Machine Works, George L. Fischer, Sr., Ford City. Built in 1903-4 for the manufacture of iron and bronze castings; one 5-gross-ton side-blown Bessemer converter added in 1906 and first blow made in June, 1906; plant partly burned in February, 1907, and immediately rebuilt; adding one 10-gross-ton acid open-hearth furnace; product, steel castings for the use of the works; annual capacity, 1,500 tons of Bessemer and 6,000 tons of open-hearth castings. (Formerly owned by the Fischer Foundry and Machine Company; acquired by the present owner on October 31, 1907.)
- Franklin Plant, Cambria Steel Company, Philadelphia. Works at Franklin, a suburb of Johnstown.—*See page 155.*
- Franklin (The) Rolling Mill and Foundry Company, Edward E. Hughes, Receiver, Franklin; New York offices, 253 Broadway;

Chicago offices, 805 Gaff Building. Built in 1902-3 and first put in operation in August, 1903; enlarged in 1905-6; two 15-foot continuous heating furnaces and 3 trains of rolls (one 12 and two 18-inch); product, "U" shapes for the manufacture of tripartite steel poles and special types of high-carbon steel bars for the reinforcement of concrete; also plain rounds, squares, and flats; annual capacity, 20,000 tons of "U" shapes and 25,000 tons of other rolled products. Fuel, natural gas and coal. Charles W. Mackey, President; James W. Rowland and Charles Miller, Vice Presidents; O. D. Bleakley, Treasurer; B. Haskell, Secretary.

Franklin Works, American Steel Foundries, Chicago. Works at Franklin, Pa.—*See page 126.*

Gautier Plant, Cambria Steel Company, Philadelphia. Works at Johnstown.—*See page 155.*

Griffiths Charcoal Iron Mills, Washington. Built in 1901-2 and first put in operation on October 7, 1902; 2 sheet furnaces, 2 pair furnaces, 2 annealing furnaces, 2 hot black plate mills, (one 26 x 32 and one 26 x 38-inch,) and 2 cold mills; product, charcoal iron black plates for tinning; annual capacity, 5,600 tons; fuel, natural gas and coal. A forge containing 8 knobbling fires, one 6,000-pound hammer, 2 heating furnaces, and one 24-inch bar mill is connected with the works; first blooms made in October, 1902; product, hammered charcoal blooms rolled into sheet and tin bars for the use of the company's black plate mills; fuel, charcoal. William H. Griffiths, President; N. R. Baker, Secretary and Treasurer.—*See Tinplate and Terne Plate Works, Part III.*

Hubbard & Co., Pittsburgh; branch offices, New York, Chicago, Denver, Louisville, Birmingham, Baltimore, and San Francisco. Works at Waynesburg. Built in 1901-2 and first put in operation in July, 1902; 5 sheet and 5 pair heating furnaces, 3 annealing furnaces, three 26 x 32-inch and two 26 x 36-inch hot mills, and four 22 x 34-inch cold mills; product, shovel steel; annual capacity, 12,000 to 15,000 tons. Fuel, natural gas. (Formerly operated by the W. H. Griffiths Company, Incorporated; acquired by Hubbard & Co. on May 6, 1907.)

Humbert Works, American Sheet and Tin Plate Company, Pittsburgh. Works at South Connellsville.—*See page 58.*

Hussey-Binns Shovel Company, Machesney Building, Pittsburgh. Works originally built at Pittsburgh in 1875; new plant built in 1890-1 at Charleroi, on the Monongahela Division of the Pennsylvania Railroad; one 24-pot crucible steel-melting furnace, 25 heating furnaces, 7 trains of rolls, (one 3-stand sheet, two 2-stand shovel, two 1-stand eccentric shovel, and two 1-stand shovel strap,) 3 steam and 2 helve hammers, and numerous machines used in

shovel making; product, crucible cast steel, used by the company in making shovels, spades, and scoops; annual capacity, 2,000 tons of ingots and 1,750 tons of rolled products. Fuel, natural gas and coal. Ralph H. Binns, President; E. B. Alsop, Vice President; George V. Willson, Secretary, Treasurer, and General Manager.

Hyde Park Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Hyde Park.—*See page 58.*

Jessop Steel Company, 91 John st., New York. Works at Washington, Pa. Built in 1901-2; first crucible steel made November 13, 1902; first products rolled December 5, 1902; 2 regenerative heating furnaces, 6 coal heating furnaces, 4 coal annealing furnaces, one gas annealing furnace, one forge fire, and 2 trains of rolls (one 20-inch with 4 stands and one 24-inch with 3 stands); product, sheet and saw steel; annual capacity, triple turn, 6,000 tons. Crucible steel department contains three 36-pot steel-melting furnaces with 18 steel-melting holes; total number of pots that can be used at a single heat, 108; annual capacity, 10,000 tons of ingots. Fuel, natural gas and coal. Sydney J. Robinson, President, Sheffield, England; W. F. Wagner, Vice President, New York; Frank T. Otley, Secretary, and James Warren, Treasurer and General Manager, Washington, Pa.

Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown.—*See page 33.*

Keystone Steel Foundry Company, Avonmore. Built in 1905-6; one cupola and one 3-gross-ton Fisher steel converter; first steel made November 1, 1906; converter now idle; one 7-gross-ton acid open-hearth furnace added in 1907; product, steel castings; also makes gray iron castings; annual capacity, 5,000 tons of steel and 1,000 tons of iron castings. Fuel, bituminous coal, natural gas, coke, and oil. John Sauers, President, and A. Granville, Secretary and Treasurer, Allegheny; John Weilersbacher, Vice President, and C. J. Gehlbach, Auditor, Pittsburgh; S. A. Wallace, Manager, Avonmore. (Formerly owned and operated by the Avonmore Cast Steel Company; acquired by the present owners on October 31, 1907.)

Kittanning Iron and Steel Manufacturing Company, Kittanning; Pittsburgh offices, Farmers Bank Building. Built in 1848; rebuilt in 1880; 33 single puddling furnaces, one heating furnace, and one 3-high 22-inch train of rolls; product, muck bar; annual capacity, 20,000 tons. Fuel, natural gas exclusively. Frank C. Neale, President; Henry A. Colwell, Vice President and Superintendent; John D. Galbraith, Secretary and Treasurer.—*See Rebecca Furnaces, page 311.*

Latrobe Plant, Railway Steel-Spring Company, New York. Works at Latrobe, Pa.—*See page 179.*

Leechburg Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Leechburg.—*See page 58.*

McInnes Steel Company, Limited, Corry. Works originally built and first steel made at Emporium, Pa., in 1894; removed to Corry in 1901 and first steel made July 2, 1901; one 30-pot crucible steel-melting furnace with an annual capacity of 1,000 tons of ingots, 6 heating furnaces, and 6 hammers (one 500-lb., one 900-lb., two 1,500-lb., one 2,000-lb., and one 2,200-lb.); product, "McInnes" hammered tool steel and McInnes "Extra" air-hardening steel; also "Cello" oil-tempered steel; annual capacity of finished products, 500 tons. Fuel, coal, coke, and natural gas. Alexander McInnes, Sr., Chairman; Alexander McInnes, Jr., Secretary and Treasurer.

Meyersdale Sheet Steel Works, Meyersdale. Works commenced in July, 1904; completed and put in operation in the spring of 1905; one double pair furnace, 2 heating furnaces, one continuous annealing furnace, and 3 sheet mills (two 24 x 38-inch hot and one 24 x 38-inch cold); sheet mills formerly operated at Huntington, W. Va., by the Huntington Tin and Planished Plate Company; product, light steel sheets and range plates; annual capacity, 8,000 tons. Fuel, bituminous coal. (Formerly operated by the Meyersdale Sheet Steel Company; sold by the sheriff on September 11, 1906.)—*For sale. Address J. T. Shipley, Meyersdale.*

Monessen Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Monessen.—*See page 15.*

Monessen Plant, Page Woven Wire Fence Company, Monessen. Built in 1899-1900; first steel made May 31, 1900, and first rods rolled June 18, 1900; 3 basic open-hearth steel furnaces, (two 15-gross-ton Wellman-Seaver and one 50-gross-ton stationary,) 2 reheating furnaces, one 3-high 24-inch blooming mill, and one semi-continuous rod mill; product, ingots and wire rods; annual capacity, 50,000 tons of ingots and 60,000 tons of wire rods. Connected with the works are wire mills, a galvanizing shop, woven-wire fence works, spring works, and a machine shop; annual capacity, 50,000 net tons of wire, 3,000,000 rods of woven-wire fencing, and 6,000 tons of implement and upholstering springs. Fuel, coal and natural gas. Brand, "Page." The company also operates a plant at Adrian, Mich., which makes woven wire fence, wrought-iron fence, ornamental iron work, etc. J. Wallace Page, President; Austin Clement, Vice President; Charles M. Lamb, Vice President and General Manager; Arthur B. Cody, Secretary; L. B. Robertson, Treasurer.

- Monessen Works, Pittsburgh Steel Company, Pittsburgh. Works at Monessen.—*See pages 168-69.*
- National Foundry Company, Erie. Built in 1906-7 for the manufacture of gray iron castings; one 25-gross-ton acid open-hearth steel furnace added in 1906-7; first steel made March 4, 1907; product, railroad and general machinery castings; annual capacity, 13,500 tons of open-hearth steel and 14,000 tons of gray iron castings. Fuel, oil. E. D. Wetmore, President, and J. P. Jefferson, Secretary and Treasurer, Warren, Pa.; C. W. Davenport, General Manager, Erie.
- National Transit Company, Oil City. One 4-gross-ton special acid Bessemer steel converter built in 1900 and first steel made in that year; one crucible steel-melting furnace, one 1,000-lb. Schwartz furnace, and 4 cupolas; product, steel, brass, bronze, and iron castings for the use of the company. Fuel, oil, coke, and coal.
- National Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Monessen.—*See page 59.*
- Old Meadow Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Scottdale.—*See page 60.*
- Pennsylvania Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*See page 60.*
- Pittsburgh Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*See page 60.*
- Saltsburg Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Saltsburg.—*See page 60.*
- Scottdale Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Scottdale.—*See page 61.*
- Seamless Tube Company of America, Frick Building, Pittsburgh. Works at Monessen. Built in 1904-5 and first put in operation in 1905; 3 billet heating furnaces, 2 hydraulic billet breakers, 3 Mannesman billet piercing mills, two 20-inch mills for drawing hot pierced billets into tubes, and supplementary machinery for finishing tubes; product, tubes of all gauges and forms from 1½ inches to about 6 inches; annual capacity, 10,000 tons. Fuel, natural gas. A machine shop for the use of the company is connected with the works. Wallace H. Rowe, President; Emil Winter, Vice President; Edward H. Bindley, Secretary and Treasurer; Charles E. Beeson, Purchasing Agent.
- Sligo Rolling Mills, Sligo Iron and Steel Company, Connellsville; general sales offices, House Building, Pittsburgh. Rebuilt and first put in operation on September 30, 1903, to continue the business of the Sligo Rolling Mills, formerly located at Pittsburgh; one double and 21 single puddling furnaces, 2 bar, 2 guide, and 2 sheet furnaces, one coal hammer furnace, one open annealing fur-

- nace, 2 forge fires, one 3-high 20-inch muck mill with two sets, one 9-inch guide mill with one 12-inch roughing mill, one 16-inch bar mill, 2 sheet mills, (one 9 and one 16-inch,) one 24-inch plate mill with 2-high 66-inch roughing and 3-high 60-inch finishing mills, one 24-inch cold mill with rolls 48 inches wide, and one shingling hammer; product, iron and steel sheets from No. 9 to No. 18 gauge, iron and steel plates No. 8 gauge and heavier, and bar iron; also wrought-steel floor plates with diamond ribbed and checkered patterns; annual capacity, 30,000 tons. Fuel, coal. Brands, "Sligo," "Tyrone," and "Crown." Charles Davidson, President; James M. Reid, Vice President; Joseph McConnell, Secretary and Manager; E. T. Norton, Treasurer; O. S. Decker, General Sales Agent. Sales agents, W. C. Dickey, 1123 Broadway, New York; William Burg, 105 North Third st., St. Louis; E. D. Morton & Co., 42 Board of Trade Building, Louisville, Ky.
- Standard Tin Plate Company, Canonsburg. Built in 1902-3 and first put in operation in March, 1904; 6 sheet furnaces, 2 annealing furnaces, 6 pair furnaces, 2 pickling machines, one 3-high bar mill, six 28 x 34-inch black plate mills, and six 22-inch cold mills; product, black plates for tinning; annual capacity, 18,000 tons. Fuel, natural gas. Joseph Underwood, President; W. H. Richards, General Manager; J. V. H. Cook, Treasurer; Louis Follet, Secretary.—*See Tinplate and Terne Plate Works, Part III.*
- Tyler (The) Tube and Pipe Company, Washington; New York offices, 26 Cortlandt st. Built in 1890-1 and first put in operation in January, 1891; 5 heating furnaces and 3 trains of rolls (one 16 and two 18-inch); product, charcoal skelp iron, used in the manufacture of boiler tubes; annual capacity, 21,000 tons. Fuel, natural gas. Brands, "Algerite," "Tyler," "Diamond T," and "Diamond T Special." Lap-welded tubes from one inch to 5 inches outside diameter are made in the tube department, which is equipped with 5 lap-welding furnaces and has an annual capacity of about 25,000 tons. N. E. Whitaker, President; L. F. Doyle, Vice President; C. A. Bumpus, Treasurer.
- United States Horse Shoe Company, Erie. Built in 1904-5; construction commenced November 15, 1904; first put in operation March 16, 1905; 2 large heating furnaces, 5 small reheating furnaces, and 2 trains of rolls (one 9-inch guide and one 16-inch billet); product, billets from 1½ to 3 inches square and iron and steel bars for the manufacture of horse and mule shoes; annual capacity, 10,000 tons of billets, 9,000 tons of bars, and 120,000 kegs of horse and mule shoes. Fuel, coal. L. A. McElroy, President and Manager; J. G. Curtis, Vice President; B. S. Fletcher, Secretary; J. S. Curtis, Treasurer.

Vandergrift Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Vandergrift.—*See pages 61-62.*

Washington Tin Plate Company, Washington. Built in 1899-1900 and first put in operation in July, 1900; 2 puddling furnaces, 2 billet heating furnaces, 9 trains of rolls, (one 2-high 20-inch bar mill and five 26-inch black plate mills, all hot, and one 22 and two 24-inch cold mills,) and one 10-ton steam hammer; product, black plates for tinning; annual capacity, 11,000 tons. Fuel, natural gas. J. J. O'Connor, President, Washington; Richard W. Martin, Secretary and Treasurer, Park Building, Pittsburgh. Sales made by the company. (Formerly operated by the McClure Company; acquired by the Washington Tin Plate Company on October 1, 1907.)—*See Tinplate and Terne Plate Works, Part III.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Built in 1900 and first put in operation October 16, 1900; 3 billet heating furnaces, 6 sheet and pair furnaces, 6 annealing furnaces, 7 hot mills, (one 24-inch sheet bar, two 26 x 42-inch sheet, and four 26 x 32-inch black plate,) 3 cold mills, (one 24 x 44-inch sheet and two 22 x 34-inch black plate,) and one 6,000-lb. hammer; product, sheet iron and steel and black plates for tinning; annual capacity, triple turn, 5,700 tons of sheets and 9,500 tons of black plates. A forge, added in 1901 and first put in operation in that year, contains 8 double tuyere knobbling fires for the manufacture of charcoal knobbed blooms; annual capacity, 7,500 tons, all consumed by the company. Also operate a department for galvanizing charcoal iron sheets and steel sheets. Fuel, natural gas and charcoal. Carr H. Bowlby, President; H. B. Duncan, Secretary; T. Ross, Treasurer; W. H. Baker, General Manager.—*See Tinplate and Terne Plate Works, Part III.*

West Leechburg Steel Company, Farmers Bank Building, Pittsburgh. Works at West Leechburg. Rolling mill built in 1898; 2 heating furnaces and 7 trains of rolls (one 12-inch hot and one 12 and five 16-inch cold); product, hot and cold rolled strip steel for blanking, stamping, and drawing; annual capacity, 18,000 tons. Fuel, coal and natural gas. Adding two 35-gross-ton basic open-hearth steel furnaces; product, ingots; annual capacity, 40,000 tons. J. W. Kirkpatrick, President; F. R. Kenyon, Vice President and General Manager; James Lippincott, Secretary; J. L. Kirkpatrick, Treasurer.

Number of rolling mills and steel works in Western Pennsylvania outside of Allegheny County, the Shenango Valley, and Beaver County: 49. Of these one makes standard Bessemer steel, one makes side-blown Bessemer steel, one makes steel in a special

Bessemer converter, and one has an idle Fisher steel converter; 12 plants make open-hearth steel and 3 open-hearth steel plants are being built; and 7 plants make crucible steel.

SUMMARY FOR PENNSYLVANIA.

Total number of furnaces in Pennsylvania: 162 completed, 8 building, one partly erected, and 4 projected. Of these 104 use coke alone, 8 coke stacks are being built, and one coke stack is projected; 5 use coke alone and occasionally anthracite coal and coke mixed; 42 use anthracite coal and coke mixed, one anthracite coal and coke stack is partly erected, and 3 anthracite coal and coke stacks are projected; 2 use anthracite coal and coke mixed and occasionally coke alone; 4 use anthracite coal alone; 4 use charcoal; and one uses charcoal and coke mixed. In addition one plant makes ferro-silicon and other alloys.

Total number of bloomeries in Pennsylvania which make hammered bars, blooms, billets, etc., for sale: 8.

Total number of rolling mills and steel works in Pennsylvania: 256 completed, one building, and 5 projected. Of these 11 can make steel by the standard Bessemer process, 5 make Tropenas steel, one can make Fisher steel, one makes side-blown steel, one makes steel in a special converter, one makes steel in a modified Bessemer converter, one plant to make steel in a converter of this character is being built, and one plant to make steel in a top-blown converter is projected; 76 can make open-hearth steel, 4 open-hearth steel plants are being built, one open-hearth steel plant is partly erected, and 3 open-hearth steel plants are projected; 33 make crucible steel and one crucible steel plant is projected; 8 make blister or cemented steel, electric steel, special steel, etc.; and 2 make McHaffie steel.

DELAWARE.

ROLLING MILLS AND STEEL WORKS—8 COMPLETED AND 1 PROJECTED.

Baldt (The) Steel Company, New Castle. Built in 1903-4; first put in operation April 22, 1905; three 30-net-ton Siemens-Martin acid open-hearth steel furnaces; product, all kinds of steel castings; annual capacity, 20,000 tons. Fuel, coal and manufactured gas. Frederick Baldt, President; Rodney Thayer, Vice President; Frank A. Thayer, Treasurer; C. Ferris Jemison, Secretary.

Brylgon Steel Casting Company, New Castle. Built in 1903-4; first steel made September 22, 1904; four 2-gross-ton Bookwalter converters and 4 cupolas; product, cut-gear blanks, connecting rods, crank shafts, crossheads, low-carbon motor frames and poles, elec-

trical and other steel castings, and manganese steel castings; annual capacity, 6,000 tons. Fuel, coal, coke, and oil. Andrew Bryson, President; Charles W. Constantine, Vice President; John T. Dickson, Secretary and Treasurer.

Diamond State Steel Works, Wilmington. Two mills: Diamond State Mill, built in 1853; 2 single puddling, 8 double puddling, and 4 heating furnaces and 3 trains of rolls, (one 10 and two 18-inch.) Old Ferry Mill, built in 1868; burned and rebuilt in 1891; one single puddling furnace, 10 double puddling and 9 heating furnaces, and 8 trains of rolls, (three 9, one 10, one 14, one 16, and two 18-inch.) Product, iron and steel splice bars, track bolts, railroad spikes, boat, wharf, and countersunk spikes, machine bolts, nuts and washers, boiler, boat, and bridge rivets, bridge rods, merchant bars, rivet rods, horseshoe iron, horse and mule shoes, forgings, and castings; total annual capacity, 60,000 tons. Steel department added in 1899-1900; five 50-gross-ton Siemens open-hearth steel furnaces (4 basic and one acid) and one 34-inch blooming mill; first steel made August 23, 1900; product, steel ingots and castings, slabs, and billets; annual capacity, 150,000 tons of ingots. Fuel, producer gas and coal. Brand, the letter "S" inclosed in a diamond. Also have machine shops and an iron foundry. Now owned by a syndicate. John B. Newkirk, Syndicate Manager, Harrison Building, Philadelphia. (Formerly operated by the Diamond State Steel Company.)—*Idle and for sale.*

Minquas Iron Works, McCullough Iron Company, Equitable Building, Wilmington. Built in 1873 and started in 1875; 4 sheet and 4 pair furnaces, 5 annealing furnaces, and 8 trains of rolls (one 23-inch bar and two 22 and two 26-inch sheet, all hot, and three 22-inch sheet cold); product, fine sheet steel, black and galvanized; annual capacity, triple turn, 10,000 tons of sheets. Fuel, coal and producer gas. Henry Whiteley, President; H. H. Haines, Vice President; Martin E. Walker, Secretary and Treasurer.

Newport Rolling Mills, Marshall Iron Company, Newport. Built in 1873; one double puddling furnace, one reverberatory heating furnace, 3 grate furnaces, 4 annealing furnaces, and 4 trains of rolls (three 22-inch sheet and one 22-inch bar); product, black sheet iron and sheet steel, Nos. 16 to 28 gauge; annual capacity, 4,000 tons. Fuel, bituminous coal. Brands, a rooster and a diamond. A machine shop is connected with the works. John M. Mendin-hall, President; E. Mendin-hall, Treasurer; H. F. Weldin, Secretary.

Wilmington Iron Company, Wilmington; New York offices, West Street Building. Built in 1889; destroyed by fire in October, 1903; rebuilt in 1904; 6 single and 2 double puddling furnaces, 4 heating furnaces, and 5 trains of rolls (one 3-high 21-inch muck and

one 3-high 9-inch, two 3-high 12-inch, and one 3-high 20-inch bar); product, merchant bar iron; annual capacity, 20,000 tons. Fuel, coal. C. H. Zehnder, President; J. G. Hemsted, Vice President and General Manager; Michael Blake, Treasurer; A. C. McFarland, Secretary. (Formerly operated by the Johnson Forge Company; acquired by the present owners on January 6, 1906.)

Wilmington Rolling Mills, Wilmington, New Castle county. First mill built in 1845, second mill built in 1870, and another built in 1875; 5 heating furnaces, 3 trains of rolls, (one 17, one 21, and one 24-inch,) and 2 hammers; product, charcoal iron boiler plates and plate iron generally; annual capacity, single turn, 5,000 tons of plate iron. A forge connected with the works, built in 1866, has 6 fires and 2 hammers; product, charcoal iron blooms, consumed in the rolling mills; annual capacity, single turn, 3,000 tons. Fuel, coal in the rolling mills and charcoal in the forge. (Formerly operated by the Seidel and Hastings Company.)—*Idle*.

PROJECTED STEEL WORKS.

Tropenas Steel Works, Tropenas Steel Company, New Castle. Contemplates erecting at New Castle in the spring of 1908 two 2-gross-ton Tropenas steel converters and 3 cupolas; product, steel castings; estimated annual capacity, 2,500 tons. Fuel, coke and coal. Alexandre Tropenas, President, Montelimar, France; Arthur Simonson, Vice President, Treasurer, and General Manager, Philadelphia; David J. Reinhardt, Secretary, Wilmington.

Number of rolling mills and steel works in Delaware: 8 completed and one projected. Of these 2 can make open-hearth steel, one makes steel by the Bookwalter process, and one plant to make steel by the Tropenas process is projected. No blast furnaces.

MARYLAND.

COKE FURNACES—4.

Maryland Steel Company, Sparrows Point, Md., and Philadelphia.

Furnaces at Sparrows Point. Four stacks; fuel, coke.—*Page 148*.
Number of coke furnaces in Maryland: 4 stacks.

CHARCOAL FURNACES—1.

Muirkirk Furnace, Charles E. Coffin, Muirkirk. One stack, 36 x 8½, built in 1847; burned and rebuilt in 1888; warm blast; open top; ore, carbonate, mined in the neighborhood, roasted and crushed before using; product, pig iron for car wheels, gun carriages, flange iron, shot and shell, etc.; annual capacity, 6,000 tons. Brand, "Muirkirk." Ten charcoal kilns are connected with the furnace. Selling agents, E. H. Stroud & Co., 36 La Salle st., Chicago; George

T. Johnson & Co., Pennsylvania Building, Philadelphia; Hickman, Williams & Co., Pittsburgh.—*Active in 1906.*

Number of charcoal furnaces in Maryland: one stack.

Total number of furnaces in Maryland: 5 stacks. Of these 4 use coke alone for fuel and one uses charcoal.

BLOOMARIES—1.

Principio Forge, Principio Forge Company, lessee, Principio Furnace P. O., Cecil county; telegraph address, Perryville. Built in 1883-4; 12 fires, one heating furnace, and 2 hammers; coke run-out attached; product, charcoal blooms for boiler tubes made from iron scrap alone or from pig iron and iron scrap as desired; blooms used by the Tyler Tube and Pipe Company, of Washington, Pa.; annual capacity, 6,000 tons. Fuel, charcoal. Brand, "Principio." N. E. Whitaker, President; Charles Bumpus, Secretary. (Owned by the Whitaker Iron Company, Wheeling, W. Va.)

Number of bloomaries in Maryland which make charcoal blooms: 1.

ROLLING MILLS AND STEEL WORKS—5.

Canton (The) Iron and Steel Company, Baltimore. Works at Canton. Built in 1902 and first put in operation January 20, 1903; 8 double and 2 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 10, one 16, and two 18-inch); product, muck bar and merchant iron; annual capacity, 10,000 tons of muck bar and 30,000 tons of merchant iron. Fuel, coal. Brand, "Canton." A machine shop is connected with the works. Harry Wehr, President; John C. Brown, Secretary and Treasurer. (Formerly operated by the Baltimore Rolling Mill Company; acquired by the Canton Iron and Steel Company on July 1, 1904.)

Cumberland Rolling Mill, Maryland Rail Company, lessee, Cumberland; New York offices, 1123 Broadway. Built in 1870 as an iron rail mill; enlarged in 1873 and 1906-7; 2 continuous heating furnaces and two 3-high 23-inch rail trains; product, renewed light steel rails, 8, 12, 16, 20, 25, 30, 35, and 40 lbs. to the yard; annual capacity, 60,000 tons of renewed rails. Fuel, bituminous coal. H. H. Dickey, President; T. F. Shannon, Vice President; W. M. Roberts, Jr., Second Vice President; H. E. Weber, Treasurer; W. C. Dickey, Secretary. Sales made by the company. (Formerly leased and operated by the Schonthal Iron and Steel Company; leased by the Maryland Rail Company in August, 1905; owned by the Baltimore and Ohio Railroad Company.)

Maryland Steel Company, Sparrows Point, Maryland, and Philadelphia, Pa. Works at Sparrows Point.—*See page 148.*

Taylor (N. and G.) Company, Mariner and Merchant Building, Third and Chestnut sts., Philadelphia. Two works at Cumberland,

Md. Black Plate Mills; built in 1899 and first put in operation in February, 1900; equipped with the necessary heating and annealing furnaces and 8 hot and 8 cold mills; product, black plates for tinning; annual capacity, 25,000 tons. Open-Hearth Steel Plant and Sheet Mills; built in 1873-4, rebuilt in 1884, and since enlarged; first steel made in 1899; open-hearth plant now contains two 25-gross-ton basic furnaces with an annual capacity of 35,000 tons of ingots, one continuous ingot heating furnace, one combination bar and billet mill, and one 3-high sheet-bar mill; sheet department contains the necessary heating and annealing furnaces, 2 jobbing mills, with one stand of 26-inch roughing and 2 stands of 26-inch finishing rolls, and one 26-inch slabbing mill; product, light bars and light billets from 1½ to 3½ inches square and sheets; annual capacity, about 40,000 tons of light bars and light billets and 15,000 tons of sheets; 2 harrow disc shops, with an annual capacity of 5,000 gross tons of harrow discs and coulters from 8 to 26 inches in diameter, are connected with the works. Fuel, coal.—*See Tinplate and Terne Plate Works in Pennsylvania, Part III.*

Number of rolling mills and steel works in Maryland: 5. Of these one makes Bessemer steel and one makes open-hearth steel.

DISTRICT OF COLUMBIA.

STEEL WORKS—2.

Naval Gun Factory, United States Navy Yard, Washington. One 2-gross-ton Tropenas steel converter and one cupola built in 1903; first steel made April 16, 1903; product, steel castings for ordnance for the Navy; annual capacity, 300 tons. Fuel, coke. Also makes gray iron, bronze, and manganese-bronze castings.

Ordinance Works, Firth-Sterling Steel Company, McKeesport, Pa. Works at Giesboro Manor, District of Columbia.—*See page 173.*

Number of steel works in the District of Columbia: 2. Of these one makes Tropenas and one makes open-hearth steel castings.

VIRGINIA.

COKE FURNACES—22 COMPLETED AND 1 PARTLY ERECTED.

Alleghany Furnace, Alleghany Ore and Iron Company, Clifton Forge; branch offices, West Street Building, New York. Furnace at Iron Gate. One stack; fuel, coke.—*See page 195.*

Bristol Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnace in Washington county. One stack; fuel, coke.—*See pages 191-92.*

Buena Vista Furnace, Alleghany Ore and Iron Company, Clifton

- Forge; branch offices, West Street Building, New York. Furnace at Buena Vista. One stack; fuel, coke.—*See page 195.*
- Crozer Furnaces, Virginia Iron, Coal, and Coke Company, Bristol. Furnaces at Roanoke. Two stacks; fuel, coke.—*See page 192.*
- Dora Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Furnace at Pulaski City. One stack; fuel, coke.—*See page 192.*
- Gem Furnace, Alleghany Ore and Iron Company, Clifton Forge; branch offices, West Street Building, New York. Furnace at Shenandoah. One stack; fuel, coke.—*See page 195.*
- Graham Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Furnace at Graham. One stack; fuel, coke.—*See page 192.*
- Ivanhoe Furnace, Ivanhoe Furnace Company, owners and operators, Ivanhoe. One stack; fuel, coke. (Formerly operated by the New River Mineral Company; controlled by the Carter Iron Company.)—*See page 171.*
- Longdale (The) Iron Company, Longdale. Two stacks: No. 1, 59 x 16½, built in 1827 and rebuilt in 1873, 1889, and 1897; No. 2, 75 x 18, first blown in in February, 1881, and enlarged in 1890; rebuilt in 1897; stack raised from 60 feet to 75 feet in 1903-4 and diameter at bosh increased from 17½ feet to 18 feet; six iron pipe stoves, three to each furnace; fuel, West Virginia coke; ore, brown hematite mined near the furnaces; product, chiefly basic pig iron cast in chills; total annual capacity, 40,000 tons. Brand, "Longdale." H. Firmstone, President, and J. E. Johnson, Manager, Longdale; John L. Wilson, Treasurer, 608 Chestnut st., Philadelphia. Sales agents, Matthew Addy & Co., Cincinnati, Chicago, St. Louis, Pittsburgh, N. Y., and Philadelphia.—*No. 2 active in 1907.*
- Low Moor Iron Company of Virginia, Low Moor. Three stacks in Alleghany county. Two stacks at Low Moor: Furnace A, 74 x 18, built in 1880, and Furnace B, (alternate stack,) 85 x 19, built in 1887 and rebuilt in 1902-3; four Whitwell and three Foote stoves; fuel, New River coke; ore, local brown hematite; product, foundry pig iron; brand, "Low Moor." Covington Furnace, at Covington, one stack, 75 x 18, built in 1891-3 and blown in April 20, 1895; three Gordon-Whitwell-Cowper stoves; fuel, New River coke; ore, native hematite; product, foundry pig iron; brand, "Covington." Total annual capacity, 100,000 tons. The company operates 171 coke ovens at Low Moor, 51 ovens at Covington, and 149 ovens at Kay Moor, West Va. E. C. Means, President and General Manager, Low Moor; Frank Lyman, Vice President, Secretary, and Treasurer, 88 Wall st., New York. Selling agents: for the East, Nash, Isham & Co., 82 Beaver st., New York; for the West, Walter-Wallingford & Co., Traction Building, Cincinnati.—*Covington Furnace and Furnace A active in 1907.*

Max Meadows Furnace, Virginia Iron, Coal, and Coke Company.

Furnace at Max Meadows. One stack; fuel, coke.—*See page 192.*

Princess Furnace, Princess Furnace Company, Glen Wilton. One stack, 60 x 12½, built in 1883-4; one Whitwell and two 2-pass Foote stoves, each 60 x 15; fuel, New River coke; ore, limonite mined on the property; product, soft, strong, and very fluid foundry pig iron; annual capacity, 18,000 tons. Brand, "Princess." William W. Hearne, President, Real Estate Trust Building, Philadelphia; James A. Green, Vice President, W. L. Turner, Secretary, and E. McFarland, Treasurer, Carlisle Building, Cincinnati; J. E. Johnson, Jr., General Manager, Glen Wilton, Va. Selling agents, Matthew Addy & Co., Cincinnati and branch houses. (Formerly operated by the Princess Iron Company; acquired by the Princess Furnace Company on May 1, 1906).—*Active in 1907.*

Pulaski Iron Company, Pulaski City; main offices, Real Estate Trust Building, Philadelphia. One stack, 74 x 18, built in 1887 and blown in in February, 1888; rebuilt in 1898; four Whitwell stoves; fuel, Pocahontas coke; ores, brown hematite and limonite from the Cripple Creek region, Va., and Gossan from the Virginia Mining Company's mines; product, high-grade foundry pig iron; annual capacity, 55,000 tons. Brand, "Pulaski." The company owns 260 coke ovens, with an annual capacity of 120,000 tons. A. J. Dull, President, Harrisburg, Pa.; Edward P. Borden, Vice President, and Horace L. Haldeman, Second Vice President, Secretary, Treasurer, and Selling Agent, Philadelphia; John W. Eckman, General Manager, Pulaski.—*Active in 1907.*

Radford-Crane Furnace, Virginia Iron, Coal, and Coke Company.

Furnace at Radford. One stack; fuel, coke.—*See page 192.*

Radford Furnace, Radford Furnace P. O., Pulaski county. One stack, 36 x 10, built in 1868; charcoal first used for fuel; rebuilt to use coke in 1900; cast-iron stoves; ore, Max Creek; fuel, Pocahontas coke; product, foundry and mill pig iron; annual capacity, 4,000 tons. Address communications to Richard Wood, 400 Chestnut st., Philadelphia.—*Last active in 1900.*

Union Furnace No. 1, Union Iron and Steel Company, New York. Furnace at Big Stone Gap, Va. One stack; fuel, coke. (Union Furnace No. 2, partly built; work suspended).—*See page 113.*

Victoria Furnace, The Goshen Iron Company, lessee, duPont Building, Wilmington, Del. Furnace at Goshen. One stack, 75 x 18, built in 1882-3; first put in blast May 1, 1883; rebuilt in 1892 and 1902; one Foote and three Siemens-Cowper-Cochrane stoves; fuel, New River coke made from coal mined by the company; ore, brown hematite from the Rich Patch mines, also mined by the company; product, foundry, basic, and forge pig iron; an-

nual capacity, 50,000 tons. Brands, "Victoria" and "Goshen." The company operates 59 coke ovens at Elverton, West Va., with an annual capacity of about 18,000 net tons. Also operates a foundry and machine shop. A. J. Moxham, President, P. P. Huston, Jr., Secretary, and F. E. Fenton, Treasurer, Wilmington; L. C. Crewe, General Manager, Goshen. Selling agents, Rogers, Brown & Co., New York and branch houses. (Owned by the Chapman Iron, Coal, and Coke Company, Incorporated, which formerly operated the furnace; leased by the Goshen Iron Company on January 25, 1907.)—*Active in 1907.*

West End Furnace, West End Furnace Company, Roanoke. One stack, 82 x 16, built in 1890 and blown in December 1, 1890; four Massicks & Crooke stoves; fuel, Pocahontas coke; ore, brown hematite from Southwest Virginia partly mined by the company; product, basic, forge, and foundry pig iron; annual capacity, 48,000 tons. Brand, "Roanoke." A machine shop for the use of the company is connected with the furnace. James B. Bailey, President, and J. E. Dougherty, Secretary, Harrisburg; H. H. Greider, Manager and Treasurer, Roanoke, Va. Sales agents, B. Nicoll & Co., 61 Broadway, New York.—*Active in 1907.*

Number of coke furnaces in Virginia: 22 completed stacks and one stack partly erected on which work has been suspended.

CHARCOAL FURNACES—4.

Fosters Falls Furnace, Virginia Iron, Coal, and Coke Company.

Furnace at Fosters Falls. One charcoal stack.—*See page 192.*

Liberty Furnace, Shenandoah Iron and Coal Company, Liberty Furnace P. O., Shenandoah county; telegraph address, Edinburg. One stack, 55 x 11, built in 1890-1 on the site of a stack built in 1821 and torn down in 1890; new stack blown in early in 1891; remodeled in 1903; warm blast; Durham stove; ore, brown hematite mined on the furnace property; product, car-wheel pig iron; annual capacity, 25,000 tons. Brand, "Liberty 1812." Charcoal pits and kilns are connected with the furnace. A 3-foot gauge railroad, owned by the company, connects Liberty Furnace with Edinburg, 12 miles distant. W. R. Merriam, President and Treasurer; Andrew McKinney, Vice President; F. E. Searle, Secretary. Selling agents, L. & R. Wister & Co., Philadelphia. (Formerly operated by the Monarch Blast Furnace Company; acquired by the present company on January 26, 1905.)—*Active in 1906.*

Reed Island Furnace, Virginia Iron, Coal, and Coke Company.

Furnace in Pulaski county, Va. One charcoal stack.—*Page 193.*

White Rock Furnace, Lobdell Car Wheel Company, Wilmington, Delaware. Furnace in Smyth county, 5 miles from Rural Retreat

Station, Wythe county, Virginia. One stack, 38 x 8½, built in 1875 and blown in August 9, 1875; idle for several years; revived and put in operation in July, 1900; ore, local brown hematite mined on the furnace property; product, warm and cold blast pig iron, all consumed by the company in the manufacture of car wheels; annual capacity, 2,500 tons. Brand, "White Rock." William W. Lobdell, President, George G. Lobdell, Jr., Vice President, and C. F. Wollaston, Secretary and Treasurer, Wilmington; J. H. Wissler, Manager, Rural Retreat.—*Last active in 1904.*

Number of charcoal furnaces in Virginia: 4 stacks.

ELECTRIC PLANTS.

Virginia Electrolytic Company, Holcombs Rock; main offices, 99 Cedar st., New York. Electric furnaces started in 1892; electricity generated by water power; product, metals and alloys by electro-thermic and electrolytic methods. George F. Seward, President, and George O. Seward, Vice President and General Manager, New York. All sales made by the New York offices. (Formerly operated by the Willson Aluminum Company; acquired by the Virginia Electrolytic Company in March, 1906.)—*Active in 1907.* Total number of blast furnaces in Virginia: 26 completed and one partly erected. Of these 22 use coke, one coke stack is partly erected, and 4 use charcoal. In addition one plant makes metals and alloys by electro-thermic and electrolytic methods.

ROLLING MILLS AND STEEL WORKS—5 COMPLETED AND 1 BUILDING.

Crescent Rolling Mills, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Works at Bristol, Va.—*See page 193.*

Loucks Iron and Steel Company, Incorporated, Roanoke. Built in 1891-2 and put in operation in February, 1892; overhauled and modernized in 1906-7; 15 double puddling furnaces, one squeezer, one hammer, 3 straight-draft heating furnaces, one 12 x 35-foot continuous rail heating furnace, and 3 trains of rolls, (one 3-stand 3-high 22-inch puddle, one 18-inch Belgian roughing, and one 5-stand 12-inch finishing.) One 10-gross-ton basic open-hearth steel furnace with 2 gas producers added in 1905; this furnace, which is now idle, was used for refining pig iron. Product, ingots, muck bar, rerolled T rails from 8 to 25 lbs., merchant bar iron, bands, etc.; annual capacity, 6,000 tons of ingots, 27,000 tons of muck bar, and 24,000 tons of rerolled rails and merchant bars. Fuel, coal. W. H. Fetter, President, J. W. Grantham, Secretary, and D. S. Loucks, Treasurer, Scottdale, Pa.; P. H. Mynahan, General Manager, Roanoke. (Formerly operated by the Iron Company of America; acquired by the present company in May, 1906.)

Newport News Shipbuilding and Dry Dock Company, No. 1 Broadway, New York. Works at Newport News, Virginia. One 2-gross-ton Tropenas steel converter built in 1903 and first steel made October 1, 1903; product, high-grade steel castings up to 6,000 pounds; annual capacity, 1,000 tons. Fuel, coke. Also builds iron and steel vessels. C. B. Orcutt, President, and I. E. Gates, Treasurer, New York; W. A. Post, General Manager, Newport News.

Norfolk Iron Company, Incorporated, 73 Plume st., Norfolk. Building works at Tidewater Junction, near Norfolk; construction commenced in October, 1907; product, to be merchant bar iron. M. H. Logue, President, Walter F. Flynn, Treasurer, and W. D. Murray, General Manager, Norfolk; George W. Dusch, Vice President and Secretary, Wheeling, West Va.

Old Dominion Iron and Nail Works Company, Richmond; New York offices, 195 Broadway. Works on Belle Isle, in the city of Richmond. Founded early in the nineteenth century. Owned, operated, and enlarged by present company since 1858; 10 double puddling furnaces, 13 heating furnaces, one squeezer, and 5 trains of rolls (one 9, one 10, one 12-inch roughing to 9-inch finishing, one 18, and one 20-inch); works operated by 9 turbine water wheels and by steam generated from waste heat of puddling and heating furnaces; product, muck bar, railroad spikes, merchant, car, and bridge iron, steel wagon tires, horse and mule shoes, machine bolts, nuts, lag screws, drift bolts, washers, harrow teeth, etc.; annual capacity, 60,000 tons. Fuel, anthracite and bituminous coal and coke. Brands, "Old Dominion" for bar iron and "Hammer Brand" for horse and mule shoes. Frank Jay Gould, President; Thomas S. Wheelwright, Vice President and General Manager; H. R. Wayt, Secretary and Treasurer. (Two 3-gross-ton Bessemer converters, built in 1887, dismantled in 1907; also 137 cut-nail machines. Formerly the Old Dominion Nail Works.)

Tredegar Iron Works, The Tredegar Company, Richmond. Built in 1836; 13 coal heating furnaces, 7 gas heating furnaces, 9 coke furnaces, one scrap furnace, 7 trains of rolls, 11 hammers, and 23 spike machines; steam and water power; product, merchant bar iron, railroad axles and spikes, black boat spikes, bridge iron, fish-plates, chairs, links and pins, car iron, and horseshoes; annual capacity, 55,000 tons. Fuel, producer gas. Brands for horseshoes, "Piedmont," "Cranberry," and "Prairie." Foundry, run by water power, contains one brass and 2 air furnaces and 4 cupolas; has melting capacity of 135 tons per day and makes car wheels and castings of all kinds; machine, blacksmith, and boiler shops make car forgings and machinery. Archer Anderson, President; St. George M. Anderson, Superintendent of Rolling

Mills ; F. T. Glasgow, Superintendent of Foundry and Machine and Smith Shops ; Archer Anderson, Jr., Superintendent of Horse Shoe Factory ; John T. Anderson, General Sales Agent.

Number of rolling mills and steel works in Virginia : 5 completed and one building. Of these one makes Tropenas steel castings and one has an idle open-hearth furnace for refining pig iron.

WEST VIRGINIA.

COKE FURNACES—4.

Belmont Furnace, Wheeling Steel and Iron Company, Wheeling. One stack ; fuel, coke.—*See page 189.*

Riverside Works, Riverside Furnaces, National Tube Company, Pittsburgh. Furnaces at Benwood, West Va. Two stacks ; fuel, coke.—*See pages 36-37.*

Top Furnace, Wheeling Steel and Iron Company. One, stack ; fuel, coke. (Formerly called Top Mill Furnace.)—*See page 189.*

Number of coke furnaces in West Virginia : 4 stacks.

ELECTRIC PLANTS.

Kanawha Falls Works, Electro Metallurgical Company ; general offices, 157 Michigan ave., Chicago ; New York offices, 79 Wall st. Works at Glen Ferris, (post-office address, Ferris,) West Va. Electrical furnaces started in 1901 ; electricity generated by water power ; product, ferro-chrome, ferro-silicon, ferro-tungsten, and other ferro alloys. (Formerly operated by the Willson Aluminum Company ; acquired by the Electro Metallurgical Company on February 1, 1907.)—*Active in 1907. See Niagara Falls Works in New York, page 242.*

Total number of furnaces in West Virginia : 4 coke stacks. In addition one plant makes ferro-chrome, ferro-silicon, and other ferro alloys by electricity. No charcoal furnaces in West Virginia.

ROLLING MILLS AND STEEL WORKS—20 COMPLETED AND 1 BUILDING.

Baldwin (The) Steel Company, 133 Reade st., New York. Works at Charleston, West Va. Construction commenced in 1906 ; works completed and put in operation in March, 1907, using machinery in part from the company's abandoned plant at Cold Spring-on-Hudson, New York. Steel department contains one 24-pot and one 30-pot crucible steel-melting furnace ; 54 pots can be used at a heat ; first crucible steel made March 19, 1907 ; product, ingots ; annual capacity, 7,500 tons. Rolling mill and hammer departments contain 10 gas heating furnaces, (3 at bar mills and 7 at hammers,) 4 annealing furnaces, 2 gas producers, 2 bar mills,

- (one 10-inch and one 14-inch,) 7 hammers, (one 3-ton, one 2,500-lb., one 1,500-lb., one 1,000-lb., one 750-lb., and two 500-lb.,) 4 electric cranes, and 5 shears (3 alligator and 2 upright); first products rolled March 25, 1907; product, high-grade tool steel and steel forgings; annual capacity, 7,500 tons of rolled and forged products. Fuel, natural gas. S. W. Bowne, President, and C. F. Simmons, Vice President and Treasurer, New York; Charles W. Wright, Second Vice President, and U. C. Brewer, Secretary, Charleston, W. Va. General offices, 133 Reade st., New York; branch offices, Philadelphia, Pittsburgh, and Chicago.
- Belmont Works, Wheeling Steel and Iron Company, Wheeling.—*See page 190.*
- Benwood Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood.—*See page 190.*
- Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Va.—*See page 57.*
- Crescent Iron Works, (Whitaker Department,) Whitaker-Glessner Company, Wheeling.—*See page 188.*
- Fairmont Steel Company, Fairmont. Built in 1903 and first put in operation February 12, 1904; one continuous heating furnace and one 18-inch train of roughing and finishing rolls; product, steel rails from 16 to 30 pounds inclusive; annual capacity, 15,000 tons. Fuel, natural gas. John A. Clark, President; Clyde S. Holt, Vice President; Walton Miller, Treasurer; E. A. Billingslea, Secretary.
- Follansbee Brothers Company, Pittsburgh. Works at Follansbee, West Va. Commenced in 1902; completed in 1904; first products rolled September 6, 1904; 8 heating furnaces, 7 annealing furnaces, 2 pickling machines, one 2-high 22-inch bar mill, 4 sheet mills, (one 30 and one 36-inch hot and two 50-inch cold,) 11 black plate mills, (three 30, two 32, and one 36-inch hot and five 36-inch cold,) and one 8-ton hammer; product, sheet and tinplate bars and sheets and black plates; annual capacity, 40,000 tons of sheet and tinplate bars and 25,000 tons of sheets and black plates. Two 25-gross-ton basic open-hearth steel furnaces added in 1906; first steel made December 10, 1906; annual capacity, 35,000 tons. Fuel, natural gas and coal. Also makes tin and terne plates. B. G. Follansbee, President; William U. Follansbee, Secretary and Treasurer; Philip Schaefer, Sales Manager.—*See Tinplate and Terne Plate Works, Part III.*
- Kenton Iron and Steel Company, South Charleston. Building: construction commenced in June, 1907, using machinery from the company's former works at Mason City, W. Va.; 4 scrap heating furnaces, 2 finishing furnaces, and 2 trains of rolls (one 10

and one 23-inch); product, bar iron and bar steel; annual capacity, 15,000 tons. Brand, "Kenton." Fuel, gas. J. W. Arnold, President and General Manager, South Charleston; Harry Ankenbauer, Vice President, J. F. Ankenbauer, Secretary, and J. Ruthmeyer, Treasurer, Cincinnati.

La Belle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wheeling, West Va.—*See page 58.*

North American Steel Company, Belington. Construction commenced in October, 1904, by the Broomall Iron and Steel Company but not completed; acquired by the North American Steel Company April 12, 1906; completed and put in operation by the present owners March 19, 1907; 4 pair furnaces, 4 sheet furnaces, 2 annealing furnaces, one 9,000-lb. steam hammer, and 6 sheet mills (three 24 x 46 and one 24 x 34-inch hot and two 22 x 42-inch cold); part of machinery was formerly in the dismantled Anchor Mills, at Pittsburgh; product, iron and steel planished sheets, uniform blued polished sheets, and smooth black and common sheets; annual capacity, 10,000 tons. A planishing department with 6 heating furnaces was completed and put in operation October 14, 1905. Fuel, natural gas. Adding one 30-gross-ton basic open-hearth steel furnace with an annual capacity of 18,000 tons of ingots; also one 3-high 24-inch sheet bar mill and several soaking pits. Edward Faust, Second Vice President, and James R. Harris, Secretary and Treasurer, St. Louis, Mo.; G. C. Broomall, First Vice President, Acting President, and Manager, Belington, W. Va.

Paden City Works, Carter Iron Company, Pittsburgh. Works at Paden City, West Va. (Partly built by the Ohio Valley Steel and Foundry Company; completed by the Watson Iron and Steel Company.)—*See pages 171-72.*

Parkersburg (The) Iron and Steel Company, Parkersburg; branch offices, 408 Germania Bank Building, Pittsburgh. Built in 1901 and first put in operation December 18, 1901; one billet, 6 pair, and 6 sheet furnaces, one large and one small annealing furnace, one 22-inch bar mill, and 14 sheet mills (one 30, three 32, one 36, two 40, and two 48-inch, all hot, and one 30, two 36, one 40, and one 48-inch cold); product, fine sheet iron and sheet steel; annual capacity, 20,000 tons. Fuel, natural gas. Brand, "Parkersburg Blue." C. F. Niemann, President and Treasurer; A. E. Niemann, Vice President; A. H. Geilfuss, Secretary.

Phillips Sheet and Tin Plate Company, Clarksburg; New York offices, Whitehall Building, 17 Battery Place. Built in 1901-2 and put in operation in June, 1902; 5 single and 3 double heating furnaces, 8 pair furnaces, 3 double annealing furnaces, 8 hot

black plate mills, (six 26 x 32 and two 28 x 36-inch,) and 7 stands of 23 x 38-inch cold mills; product, black plates for tinning; also long sheets; annual capacity, 25,000 tons. Fuel, natural gas. E. W. Mudge, President; W. H. Baldridge, Vice President; E. T. Weir, Secretary and General Manager; D. M. Weir, Treasurer. (Formerly operated by the Jackson Iron and Tin Plate Company; acquired by the Phillips Sheet and Tin Plate Company on April 11, 1905.)—*See Tinplate and Terne Plate Works, Part III.*

Riverside Works, Skelp Mills, National Tube Company, Pittsburgh. Works at Benwood, West Va.—*See page 38.*

Riverside Works, Steel Works, National Tube Company, Pittsburgh. Works at Benwood, West Va.—*See page 38.*

Sabraton Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Morgantown.—*See page 60.*

Top Mill, Wheeling Steel and Iron Company, Wheeling, West Va.—*See page 190.*

West Virginia Malleable Iron Company, Point Pleasant. One 20-gross-ton acid open-hearth steel furnace built in 1903; one 10-ton coal melting furnace added in 1906; 8-annealing furnaces; product, high-grade open-hearth malleable iron castings but steel castings could be made; daily capacity, 20 tons of malleable castings. Fuel, bituminous coal and coke. J. S. Spencer, President; Homer Smith, Vice President; C. R. McCulloch, Secretary; L. C. Riddle, Assistant Secretary; T. Stribling, Treasurer; E. H. Woelffel, General Manager. Selling agent, Kessler Smith, Cincinnati.

West Virginia (The) Rail Company, Huntington. Built in 1902 by the Huntington Tin and Planished Plate Company, (Incorporated,) and equipped with hot and cold sheet mills; first put in operation December 1, 1902; acquired by the Union Rail Company July 27, 1903; sheet mills dismantled; now equipped with one continuous rail heating furnace, one 3-high 18-inch rerolling rail train, and one 800-lb. hammer; first rail rolled April 11, 1904; product, 12, 16, 20, 25, 30, 35, and 40-lb. steel rails, splice bars, bolts, and spikes; annual capacity, 30,000 tons. Fuel, coal. E. N. Huggins, President, and H. A. Zeller, Treasurer and General Manager, Columbus, Ohio; A. W. Werninger, Vice President, L. A. Pollock, Secretary, and W. A. Watters, Auditor, Huntington. Selling agents, the Joseph Schonthal Iron Company, Columbus. (Formerly owned and operated by the Union Rail Company; later leased by the Huntington Rail Manufacturing Company; acquired by the present company on May 3, 1907.)

Wheeling Steel Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood.—*See page 190.*

Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, West Virginia.—*See page 184.*

Number of rolling mills and steel works in West Virginia: 20 completed and one building. Of these 2 make standard Bessemer steel, 2 can make open-hearth steel, one open-hearth steel plant is being built, and one plant makes crucible steel.

KENTUCKY.

COKE AND BITUMINOUS COAL AND COKE FURNACES—7.

Ashland Furnaces, Ashland Iron and Mining Company, Incorporated, Ashland. Two stacks, each 75 x 17; No. 1, blown in August 31, 1869, and rebuilt in 1904-5; No. 2, blown in January 30, 1888, and rebuilt in 1904-5. No. 1 has two Massicks & Crooke stoves and one Foote stove, each 75 x 18, and No. 2 has three Foote stoves, each 73 x 18, and one Massicks & Crooke stove, 75 x 18. Fuel, raw coal and coke; ores, Bath county and Lake Superior; product, foundry and forge pig iron; also ferro-silicon from 5 to 12 per cent. and Bessemer ferro-silicon from 10 to 15 per cent.; total annual capacity, 50,000 tons. Brands, "Boyd" for foundry pig iron and "Ashland" for ferro-silicon. Connected with the furnaces are 66 bee-hive ovens with an annual capacity of 25,000 tons of coke; also a plant for the manufacture of slag cement with an annual capacity of 170,000 barrels of 340 pounds each; also a gray iron foundry and a machine shop. Robert Peebles, President; Frank Coles, First Vice President; K. L. Butler, Second Vice President; Frank B. Moore, Secretary and Treasurer; A. N. Richardson, Auditor; J. B. Rogers, Furnace Superintendent. Selling agents, Matthew Addy & Co., Cincinnati and St. Louis; M. A. Hanna & Co., Cleveland; Pickands, Brown & Co., Chicago; Walter-Wallingford & Co., Pittsburgh; Rogers, Brown & Co., Cincinnati; the Domhoff and Joyce Company, Cincinnati.—*Both active in 1907.*

Grand Rivers Furnaces, Hillman Land and Iron Company, southwest corner Ninth and Spruce sts., St. Louis. Furnaces at Grand Rivers, Kentucky. Two stacks, Nos. 1 and 2, each 60 x 13½, built in 1890-1 to use charcoal for fuel; No. 1 blown in January 12 and No. 2 March 12, 1892; fuel changed to coke in 1901; eight Durham pipe stoves; ore, local brown hematite; product, foundry and forge pig iron; total annual capacity, 45,000 tons. Brand, "Hillman." John W. Harrison, President, Tobin Building, and E. H. Simmons, Vice President and Treasurer, and G. W. Simmons, Secretary, Ninth and Spruce sts., St. Louis.—*Last active in 1903.*

Norton Iron Works, Incorporated, Ashland. One stack, 66 x 16, built in 1873, blown in February 16, 1874, and remodeled in 1877

and 1905-6; three Cowper-Kennedy stoves, each 70 x 18; fuel, coke; ore, Lake Superior; product, Bessemer and malleable Bessemer pig iron; annual capacity, 70,000 tons. Brand, "Norton." (Formerly operated under lease by the Ashland Iron and Mining Company.)—*Active in 1907. See Rolling Mills and Steel Works, page 337.*

Watts Furnaces, Virginia Iron, Coal, and Coke Company, Bristol. Furnaces at Middlesborough. Two coke stacks.—*See page 193.* Number of mineral fuel furnaces in Kentucky: 7 stacks. Of these 5 use coke alone and 2 use raw coal and coke mixed.

CHARCOAL FURNACES—1.

Center Furnace, White, Dixon & Co., lessees, Hematite; telegraph address, Cadiz. Furnace at Centre, Trigg county. One charcoal stack, originally built in 1852; remodeled in 1880; idle for many years; rebuilt in 1905 and blown in November 22, 1905; present dimensions, 35 x 9; fuel, charcoal; ore, local hematite from mines on the furnace property; product, cold-blast pig iron; annual capacity, 3,000 tons. Brand, "Hematite." Charcoal kilns with an annual capacity of 500,000 bushels are connected with the furnace. W. C. White, President; George W. Dixon, Vice President and Superintendent; J. P. White, Secretary and Treasurer. Selling agents, J. H. Hillman & Son, Pittsburgh. (Owned by the Hillman Land and Iron Company.)—*Active in 1907.*

Number of charcoal furnaces in Kentucky: one stack.

Total number of furnaces in Kentucky: 8 stacks. Of these 5 use coke alone, 2 use raw coal and coke mixed, and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—8 COMPLETED AND 1 BUILDING.

Andrews (The) Steel Company, Newport. Building works at Andrews; construction commenced in August, 1906; being equipped with three 50-gross-ton stationary open-hearth steel furnaces (one acid and 2 basic) and 2 trains of rolls (one 34-inch blooming and one 24-inch sheet bar); product, ingots, slabs, sheet and tinplate bars, billets, and forging billets; annual capacity, 33,000 tons of acid and 66,000 tons of basic ingots and 90,000 tons of rolled products. Fuel to be used, coal and producer gas. J. A. Andrews, President and General Manager; Joseph B. Andrews, Vice President, General Sales Manager, and Purchasing Agent; W. N. Andrews, Secretary; A. L. Andrews, Treasurer.

Ashland Sheet Mill Company, Incorporated, Ashland. Built in 1901-2 and first put in operation April 28, 1902; one regenerative gas billet heating furnace, 8 pair furnaces, 8 sheet furnaces, 4 an-

nealing furnaces, one 3-high 20-inch bar mill, 6 hot sheet mills, (two 33, three 38, and one 48-inch,) and two 48-inch cold mills; product, sheet and tinplate bars, merchant bars, and black and galvanized sheets of all grades; annual capacity, 25,000 tons. Fuel, coal and manufactured gas. A galvanizing plant with 2 pots and an annual capacity of 15,000 tons is connected with the works. Frank Coles, President; Robert Peebles, Vice President; A. J. McCullough, Secretary and Treasurer.

Ashland Steel Company, Incorporated, Ashland. Built in 1891; two 5½-gross-ton Bessemer steel converters, two 4-hole gas-fired soaking pits, and one 32-inch blooming mill; first blow made December 26, 1891; one modern Garrett wire-rod train added in 1900; product, billets, slabs, sheet and tinplate bars, and wire rods; annual capacity, 180,000 tons of ingots and 110,000 tons of wire rods. Fuel, coal and natural gas. I. A. Kelly, President; Thomas M. Adams, Vice President; B. H. Burr, Secretary; L. R. Putnam, Treasurer.

Ewald Iron Company, Louisville, Kentucky. Two mills: Tennessee Rolling Works, at Tennessee Rolling Works, Lyon county, built in 1846; 6 single puddling furnaces, 13 knobbling fires, 6 heating furnaces, 3 trains of rolls, and one hammer; annual capacity, 3,600 tons.—*Idle for several years.* Tennessee Rolling Mills, at Louisville, built in 1869; 14 single puddling furnaces, 6 heating furnaces, 12 knobbling fires, one bloom forge, one annealing furnace, 2 steam shingling hammers, and 5 trains of rolls (8, 12, 18, 100-inch plate, and 72-inch plate and sheet with chilled rolls); product, bar, guide, plate, and sheet iron, and tank, shell, and flange steel plates; annual capacity, single turn, 9,000 tons. Brands of iron, "Tennessee Charcoal Bloom Staybolt," "E. I. C. Charcoal," and "Laurel" charcoal iron. Fuel, charcoal and bituminous coal. L. P. Ewald, President and General Manager.

Licking Coal and Iron Company, Incorporated, Covington. Built in 1845 and thoroughly overhauled in 1895; 6 double puddling furnaces, 5 Lauth heating furnaces, 2 scrap furnaces, one 5-ton steam hammer, and 6 hot mills (one 16-inch muck, one 16-inch bar, one 8 and one 12-inch Belgian, and two 24 x 36-inch sheet); product, merchant bar iron, sheet iron, and angle, tee, jail, and sash iron; special products, shafting and charcoal bar, angle, and tee iron; annual capacity, 20,000 tons of bar iron and 6,000 tons of sheet iron. Fuel, coal. A corrugating plant is connected with the works. J. C. Droege, President; F. J. Droege, Vice President; Fred Macke, Secretary and Treasurer. (Formerly called the Licking Iron Works and operated by the Licking Rolling Mill Company; acquired by the Licking Coal and Iron

Company, Incorporated, in November, 1906.)—*The Tinsplate and Terne Plate Department has been abandoned.*

New Louisville Bolt and Iron Company, Incorporated, Louisville.

Built in 1900-1; first put in operation December 11, 1901; destroyed by fire in 1902 and rebuilt in the same year; 6 puddling furnaces, 2 scrap furnaces, one 48-inch squeezer, 2 heating furnaces, and 2 trains of rolls (one 8 and one 12-inch); product, bar iron; annual capacity, 12,000 tons of muck or scrap bar and 17,000 tons of bar iron. Fuel, coal. A department for the manufacture of sheets, to be equipped with 2 sheet furnaces, 2 annealing furnaces, and 3 sheet mills, (two hot and one cold,) is partly erected; work suspended indefinitely. George D. Todd, President, Louisville; George H. Holzbog, Vice President, Jeffersonville, Indiana. (Formerly operated by the Louisville Bolt and Iron Company, Incorporated; acquired by the present company in June, 1906.)—*Idle and for sale or lease.*

Newport Rolling Mill Company, Newport. Built in 1857 and rebuilt throughout in 1891 and 1899; 8 single puddling and 3 heating furnaces, 11 box annealing furnaces, and 10 hot sheet mills, (two 23 x 38, two 24 x 32, five 26 x 38, and one 27 x 50-inch,) and 2 cold mills (one 26 x 38 and one 27 x 50-inch); product, steel sheets for roofing, corrugating, and galvanizing purposes; annual capacity, triple turn, 36,000 tons. Fuel, coal. Brands, "Newport Best," "Globe," and "Newport Steel." Also manufactures flat galvanized sheets and painted and galvanized roofing, siding, etc., of all descriptions. J. A. Andrews, President; Joseph B. Andrews, Assistant to President and Manager of Sales; W. N. Andrews, Secretary; A. L. Andrews, Treasurer.

Norton Iron Works, Incorporated, Ashland. Put in operation in March, 1874; burned and rebuilt in 1883; 2 heating furnaces, 2 Smith gas furnaces, 126 cut-nail machines, 50 wire-nail machines, and 2 trains of rolls (one 20 and one 22-inch); product, steel cut nails, cut and wrought spikes, tack plate, wire, and wire nails; annual capacity, 350,000 kegs of cut nails and cut and wrought spikes and 420,000 kegs of wire nails. A wire-drawing plant connected with the works has an annual capacity of 30,000 tons of wire and a galvanizing plant has a capacity of 12,000 tons of galvanized wire; 6,000 tons of annealed wire can also be produced annually. Fuel, coal and manufactured gas. Brand, "Norton." T. M. Adams, President; W. B. Seaton, Vice President; R. C. Richardson, Secretary; W. C. Richardson, Treasurer.—*See page 335.*

Number of rolling mills and steel works in Kentucky: 8 completed and one building. Of these one makes Bessemer steel and one plant for the manufacture of open-hearth steel is being built.

TENNESSEE.

COKE FURNACES—18 COMPLETED AND 1 PROJECTED.

- Allens Creek Furnaces, Bon Air Coal and Iron Company, Arcade Building, Nashville. Furnaces at Mannie. Two stacks, Nos. 1 and 2, each 60 x 12, built in 1892-3; No. 1 blown in April 22, 1893, and No. 2 blown in soon afterwards; six Gordon hot-blast stoves; fuel, coke; ore, local brown hematite from the company's mines; product, high-phosphorus and high-silicon pig iron, the latter containing from 3 to 10 per cent. of silicon; also foundry iron containing from 0.70 to 0.85 per cent. of phosphorus; total annual capacity, 72,000 tons. Brand, "Mannie" for extra-fluid softeners and "Wayne" for low-phosphorus iron. A machine shop is connected with the furnaces. The company owns and operates 20-bee-hive coke ovens at Eastland, Tenn., with an annual capacity of 80,000 net tons of coke. John P. Williams, President; J. M. Overton, Vice President and General Manager; C. Cooper, Secretary; W. C. Dibrell, Treasurer; George W. Bragg, Superintendent. Selling agents, Rogers, Brown & Co., New York and branch houses. (Warner Furnace, at Warner, abandoned.)—*Both active in 1907.*
- Chattanooga Furnace, Southern Steel Company, Birmingham, Ala. Furnace at Chattanooga. One stack; fuel, coke.—*See page 200.*
- Citico Furnace, Citico Furnace Company, Chattanooga. One stack, 69 x 17, built in 1883 and first put in blast in April, 1884; four Whitwell stoves; fuel, coke from New Soddy coal; ores, Tennessee and Georgia red and brown hematite; product, forge and foundry pig iron; annual capacity, 40,000 tons. Brand, "Citico." H. S. Chamberlain, President; M. Chamberlain, Secretary and Treasurer. Selling agents, C. E. Louis, 618 Rookery Building, Chicago; C. L. Peirson & Co., Boston; Matthew Addy & Co., St. Louis; Domhoff and Joyce Company, Cincinnati.—*Active in 1907.*
- Cranberry Furnace, The Cranberry Furnace Company, Johnson City; Philadelphia offices, Drexel Building. One stack, 75 x 16½, partly erected by the Carnegie Iron Company; work suspended in 1892; stack completed in 1898 by the Carnegie Furnace Company and blown in January 2, 1899; three Whitwell stoves, each 65 x 18; fuel, coke; ore, Cranberry from the company's mines; product, low-phosphorus pig iron; annual capacity, 32,500 tons. Brand, "Cranberry." H. M. Howe, President, Alfred D. Pardee, Vice President, and F. P. Howe, Secretary and Treasurer, Philadelphia. Selling agents, Crocker Brothers, New York. (Formerly called Johnson City Furnace and owned by the Virginia Iron, Coal, and Coke Company.)—*Active in 1907.*
- Cumberland Furnace, Warner Iron Company, Nashville. Furnace

at Cumberland Furnace P. O., Dickson county. One stack, 60 x 13, built in 1892-3 and blown in March 25, 1893; three Gordon improved stoves; fuel, Virginia coke; ores, local brown and red hematite chiefly mined by the company; product, soft and foundry pig iron; annual capacity, 30,000 tons. Brands, "Warner" and "Cumberland." Joseph Warner, President; J. H. Bandy, Secretary; E. G. Moss, Superintendent. Selling agents, Rogers, Brown & Co., Cincinnati, Chicago, St. Louis, and Detroit; Hickman, Williams & Co., Cincinnati; Matthew Addy & Co., Cincinnati; the Robert Field Company, Cincinnati. (Formerly called Warner Furnace.)—*Active in 1907.*

Dayton (The) Coal and Iron Company, Limited, Dayton; sales offices, First National Bank Building, Cincinnati, Ohio. Two stacks, one 75 x 17 and one 75 x 17½, completed in 1885; one Foote and seven Whitwell stoves; fuel, coke; ores, Tennessee fossil and Georgia hematite partly mined by the company; product, foundry and forge pig iron; total annual capacity, 90,000 tons. Brand, "Dayton." Connected with the furnaces are 375 coke ovens with an annual capacity of 120,000 net tons; also a machine shop. Peter Donaldson, President and Managing Director, and James McKee, Secretary, 7 Royal Bank Place, Glasgow, Scotland; S. H. Whitaker, Assistant Managing Director, Cincinnati; A. P. Gaines, General Superintendent, Dayton.—*Both active in 1907.*

Embreeville Furnace, Embree Iron Company, 71 Broadway, New York. Furnace at Embreeville, Tennessee. One stack, 80 x 17½, built in 1891 and blown in in 1892; rebuilt in 1903; three Cowper-Kennedy stoves, each 75 x 20; fuel, coke from Big Stone Gap, Virginia; ore, local brown hematite partly mined by the company; product, malleable, foundry, forge, low-phosphorus, and high-manganese pig iron; annual capacity, 50,000 tons. Brand, "Embreeville." Charles P. Perin, President, 71 Broadway, and Willoughby L. Webb, Secretary, 63 Wall st., New York; C. P. Wheeler, Vice President and Treasurer, Rookery Building, Chicago; S. J. Fearing, Vice President, and L. W. Searles, Acting General Manager, Embreeville. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1907.*

Helen Furnace, Red River Furnace Company, Clarksville. One stack, 70 x 15½, built in 1892 and first blown in December 8, 1895; three Whitwell stoves; fuel, coke; ore, local brown hematite from the company's mines; product, foundry, high-silicon, and Tennessee-Scotch pig iron; annual capacity, 30,000 tons of high-silicon or 50,000 tons of foundry pig iron. Brands, "Red River" for low-phosphorus and "Helen" for iron containing one per cent. or over of phosphorus. Graham Macfarlane, President, General

- Manager, and Purchasing Agent, and Thomas B. Foust, Superintendent, Clarksville; H. L. Williams, Vice President, Chicago; R. B. Hickman, Secretary, and Mary A. Senter, Treasurer, Louisville, Ky. Selling agents, Hickman, Williams & Co., St. Louis, Louisville, Chicago, Pittsburgh, and Cincinnati.—*Active in 1907.*
- LaFollette Furnace No. 1, LaFollette Coal, Iron, and Railway Company, LaFollette. One stack, 75 x 17, built in 1901-2 and first blown in September 24, 1902; rebuilt in 1906; four modified Kennedy stoves, each 90 x 18; fuel, coke; ores, red fossiliferous and brown hematite partly mined by the company; product, foundry and forge pig iron but basic pig iron can be made; annual capacity, 80,000 tons. Brand, "LaFollette Foundry." Connected with the furnace are 342 coke ovens with an annual capacity of 145,000 net tons; also 2 machine shops and a foundry. An additional coke stack, 75 x 17, to be known as No. 2, is projected; estimated annual capacity, 80,000 tons of foundry pig iron. H. M. LaFollette, President and General Manager, R. B. Winkler, Vice President and Assistant General Manager, and John H. Creekmore, Assistant Secretary and Assistant Treasurer, LaFollette, Tenn.; Charles A. Stone, Secretary and Treasurer, 208 Exchange Building, Boston. Selling agent, the Robert Field Company, First National Bank Building, Cincinnati.—*Last active in 1906.*
See Projected Rolling Mills and Steel Works, page 343.
- Napier Iron Works, Nashville. Furnace at Napier. One stack, 60 x 12½, built in 1891 and blown in with charcoal as fuel in February, 1892; remodeled in 1897 and fuel changed from charcoal to coke; two fire-brick stoves; fuel, Virginia coke; ore, local brown hematite mined on the company's property at Pinkney, Lawrence county, Tennessee; product, foundry pig iron; annual capacity, 25,000 tons. Brand, "Napier." W. R. Cole, President and General Manager, William H. Lindsey, Assistant to President, J. H. Fall, Vice President, and Ira P. Jones, Jr., Secretary and Treasurer, Nashville; M. P. Gentry Hillman, General Superintendent, Napier. Selling agents, Rogers, Brown & Co.—*Active in 1907.*
- Rockdale Furnace, Rockdale Iron Company, Rockdale. One stack, 55 x 12½, built in 1890; blown in in that year using charcoal as fuel; coke substituted for charcoal in 1891; abandoned in 1898, revived in 1902, and blown in June 14, 1902; two iron pipe stoves; fuel, coke from Esserville and Norton, Va.; ore, brown from mines owned by the company at Pinkney, Tenn.; product, ferro-phosphorus and foundry, forge, and basic pig iron; annual capacity, 18,000 tons. Brand, "Rockdale." J. J. Gray, Jr., President, Treasurer, General Manager, and Purchasing Agent; John W. Walton, Vice President and Superintendent; W. C. Hopkins, Secretary

and Auditor. Sole selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1907.*

Rockwood Furnaces, Roane Iron Company, Rockwood; sales offices, Chattanooga. Two stacks: No. 1, 80 x 16, built in 1893 and blown in January 6, 1894; rebuilt in 1901; four Hugh Kennedy hot-blast stoves. No. 2, 80 x 17, partly erected in 1893 and completed and blown in in July, 1901; four Hugh Kennedy stoves. Fuel, coke; ore, red fossiliferous partly mined by the company; product, foundry and forge pig iron; total annual capacity, 100,000 tons. Brand, "Rockwood." Connected with the furnaces are 370 coke ovens with an annual capacity of 167,400 net tons; also an iron foundry for the manufacture of general machinery castings; annual capacity, 600 tons; also a machine shop. H. S. Chamberlain, President, D. P. Montague, Vice President, Orion L. Hurlbut, Secretary, and M. Chamberlain, Treasurer, Chattanooga; F. H. Clymer, Superintendent of Furnaces, Rockwood. Selling agents for New England and Eastern New York, J. Brooks Fenno & Co., Boston; for St. Louis territory, Matthew Addy & Co., St. Louis; for Ohio and Indiana, the Dombhoff and Joyce Company, Cincinnati, Ohio.—*Both active in 1907.*

South Pittsburg Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham, Alabama. Furnaces at South Pittsburg, Tennessee. Two stacks; fuel, coke.—*See page 197.*

Standard Furnace, Standard Iron Company, Nashville. Furnace at Goodrich. Original stack blown in December 23, 1885, and dismantled in 1891; present stack, 55 x 12, built on the site of the old furnace in 1891 and blown in in that year; one cast-iron pipe stove; fuel, coke; ore, local brown hematite from the company's mines; product, foundry and soft pig iron; annual capacity, 24,000 tons. Brand, "Standard." J. H. Ambrose, President and General Manager; A. H. Robinson, Vice President; E. L. Parsons, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses; Hickman, Williams & Co., Louisville and branch houses.—*Active in 1907.*

Number of coke furnaces in Tennessee: 18 completed; 1 projected.

CHARCOAL FURNACES—3 COMPLETED AND 1 TO BE REVIVED.

Aetna Furnace, J. J. Gray, Rockdale. Furnace at Aetna. One stack, 55 x 11, built in 1886 and put in blast November 13, 1886; hot or cold blast; two Whitwell stoves; fuel when last in blast, charcoal; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 18,000 tons. Brand, "Aetna." (Formerly owned by the First National Bank of Nashville; acquired by J. J. Gray on December 31, 1906.)—*Idle for many years.*

Dover Iron Company, Bear Spring. Two stacks in Stewart county: Bear Spring Furnace, (telegraph address, Tennessee Ridge,) one stack, 38 x 9½, built in 1832, abandoned in 1854, rebuilt, stopped during the civil war, rebuilt in 1873, stopped in 1888, repaired and blown in in February, 1894. Dover Furnace, at Carlisle, one stack, 36½ x 9½, built in 1828, abandoned in 1834, rebuilt in 1854, abandoned about 1880, rebuilt in 1902, and blown in February 3, 1903; partly destroyed by fire in September, 1903; rebuilt in 1903-4. Cold blast; ore, local brown hematite from the company's mines; product, low-phosphorus pig iron suitable for the manufacture of chilled rolls; total annual capacity, 7,000 tons. Brand, "Dover." Charcoal pits connected with the furnaces have an annual capacity of 700,000 bushels. Graham Macfarlane, President, J. C. Ralls, General Manager, and Mary A. Senter, Treasurer, Bear Spring, Tenn.; R. B. Hickman, Secretary, Louisville, Ky. Selling agents, Hickman, Williams & Co., Pittsburgh and branch houses. (Formerly owned by the Cumberland River Estates, Limited; acquired by the Dover Iron Company on January 1, 1906.)—*Bear Spring Furnace active in 1907; Dover Furnace last active in 1906.*

Tennessee Kaolin, Iron, and Timber Company, Incorporated, Fraternity Building, Paducah, Ky. Proposes to rebuild and revive the Great Western Furnace at Model, Tenn., which was built in 1854 and abandoned over 30 years ago; charcoal will be used for fuel and cold-blast pig iron will be made from local ores; estimated annual capacity, 5,000 tons. J. B. Bartee, President, E. R. Street, Vice President, and George F. McCandless, Secretary, Paducah; W. F. Sills, Treasurer and General Manager, Model. Number of charcoal furnaces in Tennessee: 3 completed stacks and one stack to be revived.

Total number of furnaces in Tennessee: 21 completed, one projected, and one to be revived. Of these 18 use coke, one coke stack is projected, 3 use charcoal, and one charcoal stack is to be revived.

ROLLING MILLS AND STEEL WORKS—2 COMPLETED AND
1 PROJECTED.

Knoxville Iron Company, Knoxville. Works at Lonsdale, a suburb of Knoxville. Built in 1902-3, utilizing a part of the machinery formerly in the company's works at Harriman and Knoxville; first put in operation in March, 1903; one double and 26 single puddling furnaces, 5 gas heating furnaces, and 4 trains of rolls (one 20-inch muck, one 16-inch bar, one 16-inch roughing to 9-inch finishing, and one 8-inch guide); product, merchant bar iron, 12 to 30-lb. T rails, street rails, all sizes of fish plates, and

light sections of angle and channel iron; annual capacity, from 40,000 to 50,000 tons. Fuel, coal and manufactured gas. A machine shop for the use of the company is connected with the works. William P. Chamberlain, President; T. I. Stephenson, Vice President, General Manager, and Selling Agent; Otis A. Brown, Secretary and Treasurer.

Southern Steel Works, 610-14 Boyce st., Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883 and 1904; one heating furnace, one 8-pot crucible steel-melting furnace with an annual capacity single turn, of 300 tons, one 2-gross-ton Tropenas steel converter with an annual capacity of 1,500 tons, 2 cupolas, one electric crane, and one 4,000-lb. hammer; first crucible steel made in 1883 and first Tropenas steel made December 1, 1904; product, high-speed tool steel, forgings, and steel castings. Fuel, coal and coke. T. G. Montague, President; N. T. Montague, Secretary and Treasurer. (One 3-gross-ton acid open-hearth steel furnace dismantled in 1904.)—*Idle and for sale or lease.*

PROJECTED ROLLING MILLS AND STEEL WORKS.

LaFollette Coal, Iron, and Railway Company, LaFollette, Tennessee. Contemplates erecting at LaFollette basic open-hearth steel furnaces and hot trains, of rolls.—*See LaFollette Furnace No. 1, page 340.*

Number of rolling mills and steel works in Tennessee: 2 completed and one projected. Of these one can make Tropenas and crucible steel and one plant to make basic open-hearth steel is projected.

GEORGIA.

COKE FURNACES—2.

Rising Fawn Furnace, Southern Steel Company, Birmingham Alabama. Furnace at Rising Fawn, Georgia. One stack; fuel, coke. (Formerly operated by the Georgia Iron and Coal Company.)—*See page 201.*

Rome Furnace, Rome. One stack, 65 x 12, built in 1890-1 and blown in in May, 1891, using charcoal as fuel; coke substituted for charcoal in 1906 and first coke pig iron made November 15, 1906; three Whitwell stoves; fuel, coke; ores, red and brown hematite from Floyd, Polk, and Chattooga counties; product, foundry and forge pig iron; annual capacity, 24,000 tons. Brand, "Silver Creek." Connected with the furnace are charcoal pits and kilns with an annual capacity of 2,000,000 bushels. Thomas J. Deane, lessee. (Owned by the Rome Furnace Company; leased by Mr. Deane on January 20, 1908.)—*Active in 1907.*

Number of coke furnaces in Georgia: 2 stacks.

CHARCOAL FURNACES—2.

Cherokee Furnace, Alabama and Georgia Iron Company, 111 Broadway, New York. Furnace at Cedartown. One stack, 60 x 14, built in 1874-5 and first blown in on charcoal March 22, 1877; rebuilt and changed to coke in 1885; changed to charcoal again in May, 1900; again rebuilt in 1903; cast-iron stoves; fuel, charcoal; ore, brown hematite mined by the company near the furnace; product, high-grade car-wheel pig iron; annual capacity, 20,000 tons. Brand, "Cherokee." Connected with the furnace are two 75-cord charcoal ovens with an annual capacity of 360,000 bushels of charcoal. A. Griggs, President, and Otis H. Burdette, Treasurer, Cedartown; F. M. Davis, Vice President, and Otto Arlt, Secretary, 111 Broadway, New York. Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly called the Cherokee Iron Works.)—*Active in 1907.*

Tallapoosa Furnace, Southern Car Wheel Iron Company, Tallapoosa. One stack, 60 x 11, built in 1888-9 and blown in in May, 1890; idle for many years; revived in 1900; one Player iron stove; closed top; cold and warm blast; ore, brown hematite mined by the company; product, pig iron for car wheels, chilled rolls, and malleable castings containing from 0.18 to 1.50 per cent. of phosphorus and manganese as high as 2 per cent.; annual capacity, 13,500 tons. Brand, "Blue Ridge." Charcoal pits and kilns are connected with the furnace. Rowe Price, President and Treasurer; John M. McCandless, Vice President; Walter M. Kelly, Secretary; David Gibson, Superintendent.—*Active in 1907.*

Number of charcoal furnaces in Georgia: 2 stacks.

Total number of furnaces in Georgia: 2 coke and 2 charcoal stacks.

ROLLING MILLS AND STEEL WORKS—1.

Atlanta Steel Company, Equitable Building, Atlanta. Built in 1901 and first put in operation in June, 1901; enlarged in 1905-6; equipped with two 35-gross-ton basic open-hearth steel furnaces, 5 heating furnaces, one 25-inch blooming mill, one rod mill with 6 stands of continuous and 6 stands of Belgian rolls, one 8-inch hoop and cotton-tie mill, one 18-inch light rail mill, 14 wire-drawing blocks, 40 wire-nail machines, and 2 automatic spike machines; first products rolled in June, 1901, and first open-hearth steel made in July, 1906; product, ingots, 1½-inch to 4-inch billets, wire rods, hoops, cotton-ties, bars, bands, light steel T rails, rounds, squares, plain wire, galvanized wire, barbed wire, wire nails, railroad spikes, etc.; annual capacity, 45,000 tons of ingots, 40,000 tons of billets, 30,000 tons of wire rods, rounds, squares, etc., 20,000 tons of rails, hoops, bands, cotton-ties, etc., 150,000

kegs of wire nails, (100 pounds,) 100,000 kegs of railroad spikes, (200 pounds,) 10,000 tons of plain wire, and 6,000 tons of galvanized and barbed wire. Fuel, coal and producer gas. Thomas K. Glenn, President, and C. E. Currier, Vice President. (Formerly operated by the Atlanta Steel Hoop Company; acquired by the Atlanta Steel Company on January 1, 1907.)

Number of rolling mills and steel works in Georgia: one, which makes open-hearth steel ingots as well as hot-rolled steel products.

ALABAMA.

COKE FURNACES—45 COMPLETED, 1 BUILDING, AND 3 PROJECTED.

Alice Furnace, Tennessee Coal, Iron, and Railroad Company, Birmingham. One stack; fuel, coke.—*See page 196.*

Battelle Furnace, Battelle. One stack, 85 x 19, built in 1903-4 and first blown in September 10, 1904; four 4-pass Whitwell stoves, each 80 x 20; fuel, coke made in ovens owned by the company; ore, red hematite obtained from the company's mines which are located about half a mile from the furnace; product, foundry pig iron; annual capacity, 75,000 tons. Brand, "Battelle." Connected with the furnace are 150 coke ovens with an annual capacity of 75,000 net tons. G. Gordon Green, Superintendent. Owned by William S. Rowe, Cincinnati. (Formerly operated by the Lookout Mountain Iron Company.)—*Last active in 1906. For sale.*

Bessemer Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Bessemer. Five stacks; fuel, coke.—*See pages 196-97.*

Central Iron and Coal Company, 37 Wall st., New York. Furnace at Holt, near Tuscaloosa, Ala. One stack, 85 x 18, built in 1901-3 and first blown in August 4, 1903; four Foote stoves, each 85 x 17 feet; fuel, coke; ores, local red and brown from the company's mines; product, foundry pig iron; annual capacity, 60,000 tons. Brand, "Tuscaloosa." Connected with the furnace are 164 bee-hive coke ovens and 40 by-product retort ovens with an annual capacity of 135,000 net tons of coke. Charles Smithers, Chairman of the Board of Directors; August Heckscher, President; J. W. Shook, Vice President; S. Watts Bowker, Secretary; Edward H. Fennessey, Treasurer.—*Active in 1907.*

Clifton Furnaces, Alabama Consolidated Coal and Iron Company, Birmingham. Furnaces at Ironaton. Two coke stacks.—*Page 205.*

Ensley Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Ensley. Six stacks; fuel, coke.—*For description see page 197.*

Etowah Furnaces, Alabama Consolidated Coal and Iron Company, Birmingham. Furnaces at Gadsden, Alabama. Two stacks; fuel, coke. (Formerly called the Gadsden-Alabama Furnaces.)—*See pages 205-6.*

Gadsden Furnace No. 1, Southern Steel Company, Birmingham. Furnace at Gadsden. One completed stack and 3 stacks projected; fuel, coke. (Formerly operated by the Alabama Steel and Wire Company.)—*See pages 200-1.*

Hattie Ensley Furnace, Sloss Sheffield Steel and Iron Company, Birmingham. Furnace at Sheffield. One stack; fuel, coke.—*See page 203.*

Jenifer Furnace, Jenifer Iron and Coal Company, Milwaukee, Wis. Furnace at Jenifer, Ala. One stack, 75 x 16, built in 1901 and first put in operation September 26, 1901; one improved Whitwell and two Hugh Kennedy stoves; fuel, Alabama coke; ore, local brown hematite obtained chiefly from the company's mines; product, foundry and gray forge pig iron; annual capacity, 50,000 tons. Brand, "Jenifer." The company owns 100 coke ovens at Aubrey, Ala., with an annual capacity of 50,000 net tons. John M. Thomas, President, J. M. Reibs, Vice President and Treasurer, and Fred Hoffman, Secretary, Milwaukee. (Formerly operated by the Jenifer Furnace Company; acquired by the Jenifer Iron and Coal Company in May, 1907.)—*Coke ovens active in 1907; furnace last active in 1903.*

Lady Ensley Furnace, Sloss Sheffield Steel and Iron Company, Birmingham. Furnace at Sheffield. One stack; fuel, coke. (Formerly operated and partly owned by the North Alabama Furnace Company.)—*See pages 203-4.*

Oxmoor Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Oxmoor. Two alternate stacks; fuel, coke.—*See page 197.*

Philadelphia Furnace, Sloss Sheffield Steel and Iron Company, Birmingham. Furnace at Florence. One stack; fuel, coke.—*See page 204.*

Pioneer Furnaces, Republic Iron and Steel Company, Pittsburgh, Pa. Furnaces at Thomas, Ala. Three stacks; fuel, coke. (Formerly operated by the Pioneer Mining and Manufacturing Company.)—*See page 94.*

Sheffield Furnaces, Sheffield Coal and Iron Company, Sheffield. Three stacks, each 75 x 18, built in 1887-8: No. 1 blown in in September, 1888, No. 2 blown in in October, 1889, and No. 3 blown in in April, 1896; No. 1 rebuilt in 1900 and Nos. 2 and 3 remodeled in 1897; all remodeled and reconstructed in 1903; No. 2 rebuilt in 1906; twelve Whitwell-Cowper stoves; fuel, Stonega coke

from Virginia; ores, Alabama and Tennessee brown hematite from the company's mines; product, foundry and forge pig iron; total annual capacity, 210,000 tons. Brand, "Sheffield." Connected with the furnaces are 225 coke ovens with an annual capacity of 200,000 net tons. Benjamin Strong, Jr., Receiver, 7 Wall st., New York. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Two furnaces active in 1907.*

Shelby Furnace No. 1, Shelby Iron Company, Shelby. One stack, 60 x 14, built in 1863 and rebuilt in 1889; blown in with charcoal and this fuel used for many years; coke used experimentally in June, 1906; using coke in 1907; four iron pipe hot-blast stoves, each 18 x 12; fuel, coke; ore, brown hematite obtained on the furnace property; product, foundry pig iron; annual capacity, 25,000 tons. Brand, "Imperial." T. G. Bush, President, Birmingham; B. Y. Frost, Secretary and Treasurer, 80 Broadway, New York; A. H. Avery, Assistant Treasurer, Shelby. Selling agents, the Hammond-Byrd Company, Birmingham.—*Active in 1907. See Shelby Furnace No. 2, page 350.*

Sloss Furnaces, Sloss Sheffield Steel and Iron Company, Birmingham. Four stacks; fuel, coke.—*See page 204.*

Talladega Furnace, Northern Alabama Coal, Iron, and Railway Company, 25 Broad st., New York. Furnace at Talladega, Ala. One stack, 72 x 18, built in 1889 and blown in October 5, 1889; remodeled in 1900-1; three Whitwell stoves, each 62 x 26; fuel, Alabama coke; ores, local brown and red hematite; product, foundry and forge pig iron; annual capacity, 70,000 tons. Connected with the furnace are 182 coke ovens. S. H. March, President; F. A. Vogel, Vice President and General Manager; Alfred Kimber, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Last active in October, 1903.*

Trussville Furnace, Southern Steel Company, Birmingham. Furnace at Trussville. One stack; fuel, coke. (Formerly called Ella Furnace and operated by the Lacey-Buek Iron Company.)—*See page 201.*

Vanderbilt Furnaces, Birmingham Coal and Iron Company, Woodward Building, Birmingham. One completed stack, No. 1, and one stack building, No. 2, at Boyles. Completed stack, 75 x 15½; construction commenced February 9, 1890; blown in on August 23, 1890; remodeled in 1897 and rebuilt in 1899 and 1901; four Massicks & Crooke stoves. Building stack, to be 80 x 18; construction commenced August 1, 1906; four Whitwell stoves, each 85 x 20. Fuel, Alabama coke; ore, local; product, soft foundry and gray forge pig iron; annual capacity of the completed furnace, 54,000 tons; of the building furnace, 80,000 tons. Brand,

"Vanderbilt." Connected with the furnaces are 310 coke ovens with an annual capacity of 150,000 net tons. H. M. Atkinson, President, and P. S. Arkwright, Vice President, Atlanta; W. L. Webb, Secretary, 63 Wall st., New York; and James Bonnyman, Treasurer and General Manager, Richard Peters, Jr., Assistant Treasurer and Purchasing Agent, and D. F. Gibson, Superintendent, Birmingham. Selling agents, the Domhoff and Joyce Company, Cincinnati; Matthew Addy & Co., St. Louis; Pickands, Brown & Co., Chicago; Crocker Brothers, New York and Philadelphia; J. Brooks Fenno & Co., Boston. (Formerly operated by the Tutwiler Coal, Coke, and Iron Company; acquired by the Birmingham Iron Company March 23, 1906; acquired from the latter company by the Birmingham Coal and Iron Company on September 11, 1907.)—*No. 1 active in 1907.*

Williamson Furnace, Williamson Iron Company, Birmingham. One stack, 65 x 14½, built in 1886 and first blown in in October, 1886; three Massicks & Crooke stoves; fuel, coke; ores, red fossil and brown hematite; product, foundry pig iron; annual capacity, 30,000 tons. Brand, "Williamson." F. D. Dimmick, President; L. C. Bradley, Vice President; R. K. Edwards, Secretary, Treasurer, and General Manager.—*Active in 1907.*

Woodstock Furnaces, The Woodstock Iron and Steel Corporation, Anniston. Two stacks: A, (formerly known as No. 3,) 82 x 20, built in 1887-9, blown in October 10, 1889, and rebuilt in 1901-2; B, (formerly known as No. 4,) 75 x 17, built in 1887-9, blown in June 12, 1892, and rebuilt in 1896 and 1903; each furnace has four 2-pass stoves; fuel, Alabama coke; ore, local brown hematite; product, foundry and forge pig iron; total annual capacity, 175,000 tons. Brand, "Woodstock." Connected with the furnaces are 376 coke ovens. James M. Barr, President and Treasurer, and A. W. Wagner, Secretary, Norfolk, Va.; J. B. Carrington, Vice President, H. T. DeBardeleben, Vice President and General Manager, J. G. Thompson, Jr., Superintendent, J. W. Porter, Auditor, and C. A. Carpenter, Purchasing Agent and Assistant Treasurer, Anniston. Selling agents, Rogers, Brown & Co., Cincinnati and branch houses. (Formerly operated by the Woodstock Iron Works; acquired by the Woodstock Iron and Steel Corporation on November 15, 1906.)—*Furnace B active in 1907; Furnace A last active in 1903.*

Woodward Iron Company, Woodward. Three stacks: No. 1, 75 x 17, and Nos. 2 and 3, each 85 x 20. No. 1, built in 1882-3 and first-blown in in August, 1883, has four Whitwell stoves, one 70 x 18 and three 70 x 17; No. 2, built in 1886, first blown in in January, 1887, and rebuilt in 1906-7, has one Whitwell stove, 80 x 20,

and four Foote stoves, each 90 x 20; No. 3, built in 1902-5 and first blown in June 23, 1905, has five Whitwell stoves, each 80 x 20. Fuel, coke made from the company's coal; ores, red fossiliferous mined within 3 miles of the furnaces and brown ore from the company's mines at Woodstock; annual capacity, 250,000 tons of basic, foundry, and forge pig iron. Brand, "Woodward." Connected with the furnaces are 772 coke ovens with an annual capacity of 425,000 net tons; also a foundry; also machine, locomotive repair, and car shops. J. H. Woodward, President, and A. H. Woodward, Vice President, Birmingham; R. H. Banister, Secretary, and Charles H. Abbott, Treasurer, Woodward. Selling agents, Hickman, Williams & Co., Louisville, St. Louis, and Chicago; N. S. Bartlett & Co., Boston; Nash, Isham & Co., New York; Walter-Wallingford & Co., Cincinnati; J. J. Mohr & Son, Philadelphia; T. H. Benners & Co., Birmingham.—*Nos. 1 and 3 active in 1907; No. 2 being rebuilt.*

Number of coke furnaces in Alabama: 45 completed stacks, one stack building, and 3 stacks projected.

CHARCOAL FURNACES—5.

Attalla Furnace, Eagle Iron Company, Chattanooga, Tenn. Furnace at Attalla, Ala. One stack, 55 x 11, built in 1888-9 and blown in June 15, 1889; iron stoves; ores, red and brown hematite from Etowah and Cherokee counties; product, car-wheel pig iron; annual capacity, 18,000 tons. Brand, "Rome." Charcoal pits and kilns with an annual capacity of 2,400,000 bushels are connected with the furnace. L. S. Colyar, President and Treasurer; D. G. Crabtree, Secretary and Assistant Treasurer. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, St. Louis, Chicago, and branch houses.—*Active in 1907.*

Quinn Furnace, Quinn Furnace Company, Gadsden. One stack, 65 x 12, built in 1882 with material from the Vigo Iron Company's No. 1 Furnace at Terre Haute, Ind.; first blown in May 30, 1883; abandoned in 1898; revived and again blown in 1902; remodeled in 1905-7; hot blast; ores, local red and brown hematite; product, car-wheel pig iron; annual capacity, 22,000 tons. Brand, "Alamo." Connected with the furnace are 46 charcoal ovens with an annual capacity of 1,680,000 bushels. A. H. Quinn, Anniston, and Joseph Balfour, Gadsden, Receivers. (Formerly called Coosa Furnace and operated by the Southern Car and Foundry Company; acquired by the Quinn Furnace Company in January, 1906.)—*Active in 1907.*

Rock Run Furnace, The Bass Foundry and Machine Company,

Rock Run. One stack, 54 x 11, built in 1873-4, enlarged in 1881 and 1892, and rebuilt in 1894 and 1907; warm blast; ore, local brown hematite from the company's mines; product, pig iron for car wheels and strong castings; annual capacity, 15,000 tons. Brand, "Rock Run." Connected with the furnace are 24 charcoal kilns with a total annual capacity of 1,100,000 bushels. J. H. Bass, President, C. T. Strawbridge, Vice President and Secretary, G. M. Leslie, Treasurer, and R. J. Fisher, Assistant Treasurer, Fort Wayne, Indiana; J. M. Garvin, Manager and Assistant Treasurer, Rock Run, Alabama. Selling agents, Crocker Brothers, 99 John st., New York; the Domhoff and Joyce Company, Cincinnati.—*Active in 1907.*

Round Mountain Furnace, Round Mountain Iron and Wood Alcohol Company, Round Mountain, Cherokee county. One stack, 45 x 9½, built in 1853, rebuilt in 1874, and remodeled in 1888; cold blast; ore, red fossiliferous chiefly from the company's mines; product, low-phosphorus and high-grade car-wheel pig iron; annual capacity, 6,500 tons. Brand, "Round Mountain." Connected with the furnace are 25 brick charcoal ovens; annual capacity, 1,021,300 bushels. Thomas H. Kelley, Receiver, 41 East Fourth st., Cincinnati, Ohio.—*Last active in December, 1906.*

Shelby Furnace No. 2, Shelby Iron Company, Shelby. One stack, 60 x 14, built in 1873; warm blast; three iron-pipe hot-blast stoves, each 18 x 12; ore, brown hematite from the furnace property; product, car-wheel pig iron; annual capacity, 25,000 tons. Brand, "Shelby." The company makes about 2,000,000 bushels of charcoal annually.—*Active in 1907. See Shelby Furnace No. 1, page 347.*

Number of charcoal furnaces in Alabama: 5 stacks.

Total number of furnaces in Alabama: 50 completed, one building, and 3 projected. Of these 45 use coke, one coke stack is being built, 3 coke stacks are projected, and 5 stacks use charcoal.

ROLLING MILLS AND STEEL WORKS—14.

Alabama Tube and Iron Works, E. H. Thornton, Atlanta, Ga. Works at Helena, Ala. Started in March, 1873; enlarged in 1889; one double and 11 single puddling furnaces, one rotary squeezer, three 4-door reverberatory heating furnaces, 2 hammers, and 3 trains of rolls (one 2-high 18-inch muck with separate roughing and finishing rolls, one 3-high 16-inch skelp and bar mill with 3 stands of rolls, and one 8-inch guide mill with 4 stands of rolls); product, muck bar, skelp, and merchant bars; annual capacity, not given. Fuel, bituminous coal. A plant for the manufacture of wrought-iron pipe is connected with the works; sizes, from ½

of an inch to 2 inches; annual capacity, 15,000 tons. Fuel, bituminous coal and producer gas. A galvanizing plant and machine shop are also connected with the works. (Formerly owned by the Alabama Tube and Iron Company.)—*Idle and for sale.*

Alabama Works, Republic Iron and Steel Company, Pittsburgh. Works at Gate City, Alabama.—*See page 94.*

Anniston Works, Western Steel Car and Foundry Company, lessee, Old Colony Building, Chicago; other offices, 24 Broad st., New York, Farmers Bank Building, Pittsburgh, and Candler Building, Atlanta. Works at Anniston, Ala. Built in 1884 and enlarged in 1888-9, 1893, and 1906; 15 single and 3 double puddling furnaces, 6 heating furnaces, one scrap furnace, 3 trains of rolls, (one 18-inch muck, one 19-inch bar, and one 10-inch merchant and guide,) and 4 hammers (one 6,000-lb., two 4,000-lb., and one helve); product, iron and steel car axles and merchant bar iron; annual capacity, 9,000 tons of forged and 30,000 tons of rolled products. Fuel, coal. Plants for the manufacture of gray iron and malleable castings, iron and steel car and locomotive axles, bolts, rivets, and light and heavy iron and steel forgings are connected with the works; also a plant for building wooden freight cars. The company also builds cars at Burnham, Illinois, and steel underframes at Joliet, Illinois. It also makes iron and steel forgings at Burnham and bolts and rivets at Burnham and Joliet; also gray iron and malleable castings at Burnham. F. N. Hoffstot, President, 24 Broad st., and A. H. Larkin, Secretary, 54 Wall st., New York; J. W. Friend, Vice President, and J. M. Lambing, Assistant Treasurer, Pittsburg; P. G. Jenks, General Manager and Treasurer, Chicago. (Now owned and formerly operated by the Illinois Car and Equipment Company, Rookery Building, Chicago; leased by the Western Steel Car and Foundry Company on December 7, 1904.)

Bessemer Rolling Mills, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Bessemer.—*See page 198.*

Birmingham Mill, Republic Iron and Steel Company, Pittsburgh. Works at Birmingham, Ala. (Formerly called the Birmingham Rolling Mills and operated by the Birmingham Rolling Mill Company; the open-hearth furnaces are leased to and operated by the Tennessee Coal, Iron, and Railroad Company.)—*See Birmingham Mill, pages 94-95, and Birmingham Steel Works, page 198.*

Birmingham Steel and Iron Company, Birmingham. One 10-grosston basic open-hearth steel furnace built in 1904; first steel made October 1, 1904; product, general machinery castings; also makes ingots; annual capacity, 2,000 tons. Fuel, producer gas. This company succeeds the Hood Machine Company and in addition to

steel castings makes forgings, etc.; also does general foundry and machine work. W. T. Adams, President and Treasurer; George W. Hays, Superintendent.—*Open-hearth furnace idle and for sale or lease.*

Birmingham Steel Works, Tennessee Coal, Iron, and Railroad Company, lessee, Birmingham. (Owned by the Republic Iron and Steel Company, which now operates the trains of rolls; formerly operated by the Birmingham Rolling Mill Company.)—*See Birmingham Mill, pages 94-95, and Birmingham Steel Works, page 198.*

Eclipse Rolling Mill, East Birmingham. Built in 1904 and first put in operation on May 1, 1904; 3 heating furnaces, 4 trains of rolls, 2 spike machines, and 2 hammers (50 and 75-lb.); product, bar iron, spike iron, railroad spikes, washer iron, drift bolts, harrow teeth, cut washers, fence iron, bedstead iron, angles, cotton-ties, and buckles; annual capacity, 12,000 tons of rolled products and 20,000 kegs of spikes. Fuel, coal and coke. W. C. Shackelford and Louie Gelders, owners, 1031 National Bank Building, Birmingham. (Formerly operated by the Eclipse Rolling Mill and Manufacturing Company.)—*Idle and for sale or lease.*

Ensley Works, Southern Steel Company, Birmingham. Works at Ensley. (Formerly operated by the Alabama Steel and Wire Company.)—*See page 201.*

Gadsden Works, Southern Steel Company, Birmingham. Works at Gadsden. (Formerly operated by the Alabama Steel and Wire Company.)—*See page 201.*

Sheffield Rolling Mill, Sheffield Rolling Mill Company, Sheffield. Built in 1897-8 and first put in operation in October, 1898; 12 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 3-high 18-inch muck and billet, one 3-high 16-inch bar, one 10-inch guide, and one 10-inch hoop and cotton-tie); product, bar, rod, and band iron and steel; also iron and steel hoops, cotton-ties, cotton-tie buckles, and railroad and boat spikes; annual capacity, 30,000 tons. Fuel, bituminous coal. Robert C. Johnston, President; Thomas F. Johnston, Secretary and Treasurer.

Steel Casting Department, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley.—*See page 198.*

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley.—*See pages 198-99.*

Weller Rolling Mill and Forge, Emery Steel Company, lessee, Birmingham. Works at Gadsden. Built in 1906-7 using the machinery formerly in the rolling mill at Anniston, which was partly destroyed by fire in the fall of 1905; 13 single puddling furnaces, 2 large heating furnaces, 2 trains of rolls, (one 3-high 20-inch muck and one 3-high 12-inch finishing,) and 2 spike ma-

chines; first products rolled on October 21, 1907; product, merchant iron and steel, concrete bars, light T rails, special shapes, and all sizes of railroad spikes; annual capacity, 15,000 tons of rolled material. Fuel, bituminous coal. J. A. Emery, President and Treasurer, J. H. Pritchard, Vice President, and R. C. Foster, Secretary, Birmingham. Selling agents, R. C. Foster & Co., Birmingham. (Owned by the Weller Rolling Mill and Forge Company; leased by the Emery Steel Company in September, 1907.) Number of rolling mills and steel works in Alabama: 14. Of these one has Bessemer converters for desiliconizing and decarburizing molten metal and 5 have open-hearth steel plants.

TEXAS.

COKE FURNACES—3.

Jefferson Furnace, Jefferson Iron Company, Jefferson. One stack, 60 x 12, built in 1889-91 and blown in with charcoal for fuel on March 15, 1891; fuel to be changed to coke in 1908; two Durham iron stoves; fuel, coke; ore, brown hematite from Marion county; product, foundry pig iron; annual capacity, 36,000 tons. Brand, "Jefferson." A. L. Clark, President; A. B. Blevins, Vice President; S. A. Fain, Secretary and Treasurer.—*Last active in 1904.*

Sam Lanham Furnace, State of Texas, owner, Rusk. Original stack, known as "Old Alcalde," built in 1883 and put in blast with charcoal as fuel February 27, 1884; rebuilt in 1896; old furnace torn down in 1903 and entirely rebuilt; present size of furnace, 65½ x 12; blown in with charcoal as fuel April 6, 1904; fuel changed to coke in 1905 and first coke pig iron made in September, 1905; three hot-blast stoves, each 60 x 16; fuel, principally Connellsville and Stonega (Va.) coke; ore, brown hematite mined near the furnace; product, foundry and forge pig iron and 8 to 10 per cent. ferro-silicon; annual capacity, 36,000 tons. Brand, "Lone Star." J. W. Wright, Financial Agent, Tyler, Texas; Frank B. Guinn, Assistant Financial Agent and Selling Agent, and W. T. Weaver, Superintendent, Rusk.—*Active in 1907.*

Star and Crescent Furnace, Frank A. Daniels, New Orleans, La. Furnace near Rusk, in Cherokee county, Texas. One stack, 65 x 11, built in 1890-1 and blown in with charcoal as fuel November 26, 1891; relined and fuel changed to coke in 1907 and first coke pig iron made in the spring of 1907; four iron stoves; fuel coke; ores, brown hematite and black laminated; product, foundry pig iron; annual capacity, 25,000 tons. Brand, "Star and Crescent."—*Active in 1907. Idle and for sale or lease.*

Number of coke furnaces in Texas: 3 stacks.

CHARCOAL FURNACES—1.

Tassie Belle Furnace, New Birmingham, (post-office address, Rusk.) One stack, 60 x 11, built in 1889-90 and blown in in November, 1890; two Weimer pipe stoves; warm blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 tons. Brand, "Tassie Belle." (Owned by the New Birmingham Development Company, R. L. Coleman, Agent.)—*Idle for several years and for sale or lease.*

Number of charcoal furnaces in Texas: one. Total number of furnaces in Texas: 4. Of these 3 use coke and one uses charcoal.

ROLLING MILLS—1.

Fort Worth Iron and Steel Company, Fort Worth. Works at Dolard. Construction commenced in October, 1904; completed and put in operation April 25, 1905; destroyed by fire in February, 1907; immediately rebuilt and put in operation March 11, 1907; one double and 2 single puddling furnaces, 3 busheling furnaces, 3 heating furnaces, 3 trains of rolls, (one 16-inch muck, one 10-inch guide with 5 stands, and one 8-inch Belgian,) 3 spike machines, and 4 bolt machines; product, merchant iron bars, track bolts, track spikes, etc.; annual capacity, 15,000 tons. Fuel, oil. William Capps, President; J. T. Anderson, Vice President; William Bryce, Secretary and Treasurer; F. M. Diver, Purchasing and Sales Agent. (Name of company changed on January 1, 1907, from the Fort Worth Iron and Steel Manufacturing Company to the Fort Worth Iron and Steel Company.)

Number of rolling mills in Texas: one. No steel plants.

OHIO.

MAHONING VALLEY.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Mahoning and Trumbull Counties; also in a part of Columbiana County.

COKE FURNACES—18 COMPLETED, 4 BUILDING, AND 3 PROJECTED.

Anna Furnace, The Struthers Furnace Company, Citizens Building, Cleveland. Furnace at Struthers. One stack, 75 x 17, built and blown in in 1869; rebuilt in 1881 and in 1895; four Julian Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, basic, forge, and malleable pig iron cast in chills; annual capacity, 100,000 tons. Brand, "Struthers." A second stack is projected. Equipped with one Uehling pig-iron casting machine. A plant for the manufacture of cement from blast furnace slag is connected with the works; daily capacity, 1,000

barrels; brand, "Struthers Cement." W. C. Runyon, President; George L. Fairbank, Vice President; A. Grossman, Secretary and Treasurer; S. A. Richards, Manager.—*Active in 1907.*

Cherry Valley Furnace, United Iron and Steel Company, Pittsburgh. Furnace at Leetonia, Ohio. One stack; fuel, coke. (Formerly owned and operated by the Cherry Valley Iron Company.)—*See page 175.*

Grace Furnace No. 2, The Brier Hill Iron and Coal Company, Youngstown. One stack, 77 x 19, built in 1890; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, basic, strong foundry, and malleable Bessemer pig iron; annual capacity, 125,000 tons. Brand, "Brier Hill." Equipped with one Davies pig-iron casting machine. George Tod, President; J. G. Butler, Jr., Vice President and General Manager; H. H. Stambaugh, Treasurer; R. C. Steese, Secretary.—*Active in 1907. To be rebuilt in the spring of 1908; size, 85 x 20½; four stoves, each 85 x 19½; annual capacity, 140,000 tons.*

Hannah Furnace, Republic Iron and Steel Company, Pittsburgh. Furnace at Youngstown. One stack; fuel, coke.—*See page 93.*

Haselton Furnaces, Republic Iron and Steel Company, Pittsburgh. Furnaces at Haselton. Three stacks; fuel, coke.—*See pages 93-94.*

Hubbard Furnaces, The Andrews and Hitchcock Iron Company, Youngstown. Works at Hubbard. Two stacks: No. 1, 77 x 17½, built in 1867, and No. 2, 75 x 17½, built in 1872; No. 1 rebuilt in 1886 and No. 2 rebuilt in 1883, 1894, and 1903; Nos. 1 and 2 have each four Cowper-Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, gray forge, malleable Bessemer, and foundry pig iron; total annual capacity, 220,000 tons. Brands, "Hubbard," "Hubbard Scotch" soft foundry, and "Climax" strong foundry. Frank Hitchcock, President; W. J. Hitchcock, Vice President; H. W. Heedy, Secretary and Treasurer. Selling agents, J. Brooks Fenno & Co., 44 Kilby st., Boston; Jerome Keely & Co., Philadelphia; Brown-Fuller Company, Cleveland.—*Both active in 1907.*

McKeefrey Furnace, The Salem Iron Company, Pittsburgh. Furnace at Leetonia, Ohio. One stack, 76 x 17, built in 1866 and rebuilt in 1894; four Cowper-Kennedy stoves, each 75 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, malleable Bessemer, foundry, and forge pig iron; annual capacity, 90,000 tons. Brands, "Seneca," "Allegheny," and "Grafton." John McKeefrey, President; W. D. McKeefrey, Vice President and General Manager; N. J. McKeefrey, Secretary and Treasurer. Selling agents, McKeefrey & Co., Leetonia and Pittsburgh.—*Active in 1907.*

- Mary Furnace, The Ohio Iron and Steel Company, Lowellville. One stack, 85 x 18, built in 1845, rebuilt in 1872, and remodeled in 1883, 1894, and 1898; four Cowper-Kennedy hot-blast stoves, three 80 x 18 and one 90 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, forge, and foundry pig iron; annual capacity, 150,000 tons. Brands, "The Mary" for lake ore iron and "The Mary Ohio Scotch." Robert Bentley, President and General Manager; John C. Wick, Vice President; F. H. Wick, Treasurer; David Davis, Secretary. Selling agents, Pickands, Brown & Co., Chicago; Pickands, Mather & Co., Cleveland; George T. Johnson & Co., Pennsylvania Building, Philadelphia; N. S. Bartlett & Co., New York and Boston.—*Active in 1907.*
- Mattie Furnace, Girard Iron Company, operators, Girard. One stack; fuel, coke. (Owned by the A. M. Byers Company, Pittsburgh.)—*See pages 169-70.*
- Niles Furnace, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnace at Niles. One stack; fuel, coke.—*See page 9.*
- Ohio Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces at Youngstown. Four completed stacks and 2 stacks building; fuel, coke.—*See pages 9-10.*
- Tod Furnace, The Youngstown Steel Company, Youngstown. One stack, 79 x 17, built in 1889 and rebuilt in 1896; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and basic pig iron; annual capacity, 100,000 tons. One 10-gross-ton Pernot revolving furnace is connected with the furnace; product, washed metal for steel-making purposes; annual capacity, 40,000 tons. Also a slag granulating pit; annual capacity, 40,000 tons of concrete and slag sand. President, vacant; Paul Jones, Vice President; John Stambaugh, Secretary and Treasurer; E. L. Ford, General Manager.—*Active in 1907.*
- Youngstown (The) Sheet and Tube Company, Youngstown. Two stacks building and 2 projected; fuel, coke.—*See page 180.*
- Number of coke furnaces in the Mahoning Valley, including furnaces in a part of Columbiana county: 18 completed stacks, 4 stacks building, and 3 stacks projected. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—15.

- Bessemer Plant, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*See page 94.*
- Brown Bonnell Works, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*See page 95.*
- Empire (The) Iron and Steel Company, Niles. Built in 1902 and first put in operation in October, 1902; one busheling furnace, one bar furnace, 6 sheet furnaces, 6 pair furnaces, 8 annealing fur-

naces, one scrap furnace, one squeezer, 8 sheet mills, (2 roughing and 6 finishing,) 3 cold mills, 2 cranes, and 4 shears; product, sheet steel specialties, sheets from No. 10 to No. 30 gauge, shovel steel, and cutlery steel; annual capacity, 20,000 tons. Fuel, coal. Brand, "Empire." A galvanizing plant is connected with the works. John Warner, President, Youngstown; W. T. Hardesty, Vice President, and Jacob D. Waddell, Secretary and Treasurer, Niles.

Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio.—*Idle; works closed indefinitely. See page 57.*

Lower Union Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown, Ohio.—*See page 14.*

Mahoning Valley Works, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*See page 95.*

Niles (The) Iron and Steel Company, Niles. Built in 1901 and first put in operation in May, 1901; 4 pair furnaces, 4 sheet furnaces, 3 double annealing furnaces, 4 hot sheet mills, (36 and 40-inch,) one 36-inch black plate mill, and two 40-inch cold mills; product, galvanized corrugated and painted corrugated roofing and flat galvanized and flat black sheets; also stamped sheets; annual capacity, 20,000 tons. Fuel, coal. W. A. Thomas, President; C. G. Thomas, Vice President and Treasurer; C. R. Thomas, Secretary. (Formerly called the Niles Iron and Sheet Company; name of company changed to the Niles Iron and Steel Company on April 18, 1907.)

Ohio Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown, Ohio. An open-hearth steel department to contain twelve 50-gross-ton basic furnaces is being added.—*See pages 15-16.*

Penn (The) Shovel Manufacturing Company, Warren. Works for the manufacture of shovels built in 1903; rolling mill added in 1906-7 and first put in operation in May, 1907; one heating furnace and one 24-inch train of grooved and plain rolls; product, shovel and tack plate for the use of the company and for sale; annual capacity, 3,000 tons. Fuel, oil. Adding one heating furnace. Also makes shovels, scoops, and spades; annual capacity, 80,000 dozen. A machine shop for the use of the company is connected with the works. President, vacant; Clay Hanna, Vice President and General Manager; Washington Hyde, Secretary; W. Gordon Brown, Treasurer; Charles A. Day, Sales Manager.

Struthers Plant, Morgan Spring Company, Worcester, Mass. Works at Struthers, Ohio. Originally built by the Youngstown Manufacturing Company in 1902 for the manufacture of bolts, nuts,

and rivets; one 10-inch train of rolls added in 1903 and put in operation in April of that year; later acquired by the Youngstown Bolt Company; purchased by present owners in 1905 and train of rolls dismantled; now equipped with one Morgan suspended roof continuous billet heating furnace, 3 gas producers, 2 trains of rolls, (one 6-stand continuous roughing train having 2 stands of 12-inch and 4 stands of 10-inch rolls and one 10-inch 10-stand continuous finishing train,) 58 wire-drawing blocks, and 53 wire-nail machines; first put in operation by present owners on May 21, 1906; product, wire rods, wire, and wire nails; annual capacity, 85,000 tons of wire rods, 25,000 tons of wire, and 150,000 kegs of nails. Fuel, coal and manufactured gas. Also operates works at Worcester for the manufacture of wire, tacks, staples, springs, etc. Charles H. Morgan, President, Paul B. Morgan, Treasurer, John Burry, Secretary, and Frank F. Bullard, General Manager, Worcester, Mass.; Henry Wick, Vice President, Youngstown, Ohio.

Struthers Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Struthers, Ohio.—*See page 61.*

Upper Union Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown, Ohio.—*See page 17.*

Youngstown (The) Foundry and Machine Company, Youngstown. One 18-gross-ton Smythe acid open-hearth steel furnace built in 1902 and first steel made August 16, 1902; product, all kinds of steel castings; annual capacity, 4,000 tons. Fuel, manufactured gas. W. J. Wallis, President and General Manager; A. E. Adams, Vice President; F. A. Williams, Secretary; Bertram G. Parker, Treasurer. (Formerly operated by the Youngstown Steel Casting Company; acquired by the Youngstown Foundry and Machine Company on July 1, 1904.)

Youngstown (The) Iron and Steel Roofing Company, Youngstown. Built in 1901 and first put in operation September 4, 1901; 4 double puddling furnaces, 2 pile furnaces, 2 busheling furnaces, 2 bar heating furnaces, 5 pair furnaces, 5 sheet furnaces, 6 annealing furnaces, one squeezer, 8 sheet mills, (six 26-inch hot and two 24-inch cold,) two sets of 24 x 44-inch cold mills for the manufacture of range steel, bow socket steel, heavy gauges of expanded metal for fireproofing, etc., 3 cranes, and 6 shears; product, sheet iron and sheet steel; annual capacity, 30,000 tons. Fuel, coal. A galvanizing plant containing 2 pots is connected with the works. L. E. Cochran, President; John O. Pew, Vice President and General Manager; C. A. Cochran, Secretary; Mason Evans, Treasurer.

Youngstown (The) Sheet and Tube Company, Youngstown. (Formerly called the Youngstown Iron Sheet and Tube Company.) —*See pages 180-81.*

Number of rolling mills and steel works in the Mahoning Valley:
 15. Of these 3 make Bessemer steel, one makes open-hearth steel, and one open-hearth steel plant is being built.

LAKE COUNTIES.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Cuyahoga, Lorain, and Lucas Counties.

COKE FURNACES—13 COMPLETED, 2 BUILDING, 1 PROJECTED.

Central Furnaces, American Steel and Wire Company of New Jersey, Cleveland. Three stacks; fuel, coke.—*See page 42.*

Cleveland Furnaces, Cleveland Furnace Company, Rockefeller Building, Cleveland. One completed stack and one stack building at Cleveland. Completed stack, No. 1, 85 x 20, built in 1902-3 and first blown in August 21, 1903; four Julian Kennedy 2-pass stoves, each 90 x 22; building stack, No. 2, to be 90 x 22; construction commenced June 13, 1907; four Julian Kennedy 2-pass stoves, each 90 x 22. Fuel, by-product coke; ore, Lake Superior; product, foundry, malleable Bessemer, Bessemer, and basic pig iron; annual capacity of the completed furnace, 120,000 tons; of the building furnace, 150,000 tons: total, 270,000 tons. Brand, "Cleveland." Connected with the furnaces are by-product coke ovens with an annual capacity of 120,000 net tons. David T. Croxton, President; D. B. Meacham, Vice President; C. Bird-sall Smith, Secretary and Treasurer; G. W. English, Superintendent. Selling agents, Rogers, Brown & Co., New York and branch houses.—*No. 1 (completed) active in 1907; No. 2 (building) will probably be ready for blast in the summer of 1908.*

Emma Furnace, (now No. 4,) American Steel and Wire Company of New Jersey, Cleveland. One stack; fuel, coke.—*For a description of this furnace see page 42.*

Lorain Works, (Furnaces A, B, C, and D,) The National Tube Company (of Ohio), Lorain. Four completed stacks and one stack building (E); fuel, coke. (Formerly called Lorain Furnaces Nos. 1, 2, 3, and 4.)—*See pages 31-32.*

Newburgh Furnace, (now No. 3,) American Steel and Wire Company of New Jersey, Cleveland. One stack; fuel, coke.—*For a description of this furnace see page 43.*

Toledo Furnaces, The Toledo Furnace Company, Western Reserve Building, Cleveland. Furnaces at Toledo. Two stacks: Furnace A, 80 x 19, built in 1902-3 and first put in operation May 31, 1903; Furnace B, 80 x 20, construction commenced on March 1, 1906, and first put in operation January 5, 1907; each furnace has four Kennedy stoves, each 92 x 22; fuel, coke; ore, Lake Superior; product, Bessemer, basic, malleable, and foundry pig iron; total

annual capacity, 265,000 tons. Brand, "Toledo." Equipped with one Uehling pig-iron casting machine. H. G. Dalton, President and Treasurer; Samuel Mather, Vice President; E. P. Williams, Secretary; E. B. Hull, General Superintendent. Selling agents, Pickands, Mather & Co., Cleveland.—*Both active in 1907.*

Upson Furnace, The Upson Nut Company, Garfield Building, Cleveland. One stack, 73 x 17, built in 1879; remodeled in 1889 and 1895; rebuilt in 1902; four Foote stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, forge, and malleable pig iron; annual capacity, 75,000 tons. Brand, "Upson Scotch." The company also makes bolts, nuts, and carriage hardware. A. S. Upson, President; W. A. Hitchcock, Secretary; C. H. Graham, Treasurer; R. C. Bookwalter, Auditor; Willard Fuller, General Manager; F. H. Rose, General Sales Manager. (Formerly called River Furnace, owned by the Cleveland Iron Company, and operated under lease by the River Furnace and Dock Company; acquired by the Upson Nut Company on August 1, 1907.)—*Active in 1907.*

PROJECTED BLAST FURNACES—1.

Corrigan, McKinney & Co., Perry-Payne Building, Cleveland. May erect a coke stack in Cleveland or its vicinity.

Number of coke furnaces in the Lake Counties: 13 completed stacks, 2 stacks building, and one stack projected. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—19.

American Works, American Steel and Wire Company of New Jersey, Cleveland.—*See page 43.*

Biesecker Steel Mills, The Imperial Steel Company, Rockefeller Building, Cleveland. Works at Imperial Station. Originally built as a gray iron and semi-steel foundry in 1900; crucible steel-melting furnaces added in 1905 by the Continental Steel Company and first steel made in October, 1905; acquired by the American Steel Syndicate in January, 1907, partly rebuilt, and sold to the Imperial Steel Company in August, 1907; now equipped with three 8-pot crucible steel-melting furnaces; adding six 10-pot crucible steel-melting furnaces and one 15-gross-ton basic open-hearth steel furnace; product, nickel, chrome, and tungsten machinery steel and light steel castings; estimated annual capacity, 9,000 tons. Fuel, natural gas and oil. Noah Biesecker, President, Johnstown and Somerset, Pa.; Joseph B. Turner, First Vice President and Director General, Fredrick Bullinger, Second Vice President, A. S. Hill, Third Vice President, J. R. Charles, Fourth Vice President, A. Victor Zika, Secretary, and Henry E. Freeman, Treasurer, Cleveland.

Cleveland (The) Hardware Company, East Forty-fifth st., N. E., and Lakeside ave., Cleveland. Built in 1879; rebuilt in 1891; 2 heating furnaces with 2 Duff gas producers and one 10-inch train of rolls; product, rolled shapes for the manufacture of steel forgings for vehicles; annual capacity, 16,000 tons of rolled material. Fuel, bituminous coal and manufactured and natural gas. The company also operates a plant on East Seventy-ninth st., S. E., near Bessemer ave., which was built in 1906; product, steel forgings for vehicles; annual capacity, 9,000 tons of forgings. Lee McBride, President; Charles E. Adams, Vice President and General Manager; Thomas P. Robbins, Secretary and Treasurer.

Cleveland (The) Steel Casting Company, Burlington and Hubbard sts., Cleveland. Works on Hubbard st. and the Cleveland and Pittsburgh Railroad. Built in 1893; first steel made January 9, 1895; 2 acid open-hearth steel furnaces (one 15 and one 25-gross-ton); product, steel castings; annual capacity, single turn, 11,000 tons. Fuel, natural gas. W. W. Balkwill, President; N. P. Bowler, Vice President and Treasurer; G. W. Balkwill, Secretary and Assistant Treasurer. Sales made by the company.

Cleveland (The) Steel Company, Cleveland. Built in 1853 and rebuilt in 1873 and 1891; remodeled in 1894; 4 heating furnaces, 2 box annealing furnaces, and 2 trains of rolls containing 2 plate and 2 sheet mills; product, light steel plates and sheets; annual capacity, 30,000 tons. Fuel, producer gas and coal. L. M. Bowers, President; E. W. Oglebay, Vice President; J. L. Severance, Secretary; H. E. Higgins, Treasurer and General Manager.

Consolidated Works, American Steel and Wire Company of New Jersey, Cleveland.—*See page 44.*

Crescent Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cleveland, Ohio.—*See page 57.*

Elyria (The) Iron and Steel Company, Elyria; sales offices, United States Express Building, New York; Monadnock Block and Great Northern Building, Chicago; Candler Building, Atlanta, Ga.; Monadnock Building, San Francisco. Built in 1902-3 and first put in operation in the fall of 1903; 2 billet heating furnaces, 4 trains of rolls, (one 20, two 16, and one 10-inch,) and 2 railroad spike machines; product, railroad tie plates, railroad spikes, high-carbon steel tubing for bedstead, structural, and agricultural implement purposes, and agricultural implement shapes rolled from purchased steel billets and old steel rails; annual capacity, 50,000 tons. Fuel, coal. W. S. Miller, President; Hugh B. Wick, Vice President and Treasurer; J. L. Barnard, Secretary.

Empire (The) Rolling Mill Company, Cleveland. Built in 1900 and first put in operation December 15, 1900; 2 puddling fur-

naces, 8 busheling furnaces, 2 forge fires, 2 gas and 2 coal heating furnaces, and 3 trains of rolls (one 12-inch roughing, one 10-inch Belgian, and one 16-inch bar with 4 stands); product, iron and steel bars; annual capacity, 40,000 tons. Fuel, manufactured gas. C. G. Barkwill, President; W. P. Johnson, Vice President; D. R. James, Secretary and Treasurer; J. D. Paton, Superintendent. H. P. Works, American Steel and Wire Company of New Jersey, Cleveland.—*See page 44.*

Lake Erie Iron Company, Wade Building, Cleveland. Rolling mill added to a bolt and nut factory in 1899-1900 and first rolled products turned out September 28, 1900; 8 single puddling furnaces, 2 coal heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 47,500 tons. Fuel, coal and oil. W. C. Scofield, President; Frank R. Scofield, Vice President; C. W. Scofield, Secretary and Treasurer.

Lorain Works, The National Tube Company (of Ohio), Lorain.—*See page 32.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Cleveland.—*See pages 44-45.*

Otis (The) Steel Company, Limited, Cleveland. Built in 1873-4 and put in operation in the fall of 1874; 9 Siemens heating furnaces, 2 hammers, 8 open-hearth furnaces, (three 15-gross-ton acid and five 30-gross-ton basic,) and 3 trains of rolls (one 30, one 31, and one 34-inch); first acid open-hearth steel made on October 23, 1874, and, first basic open-hearth steel made on January 20, 1886; product, steel ingots, steel castings, steel plates, bar steel, and forgings; annual capacity, 20,000 tons of acid open-hearth ingots, 90,000 tons of basic open-hearth ingots, 20,000 tons of open-hearth castings, 70,000 tons of rolled products, and 5,000 tons of forged products. Fuel, coal and natural and producer gas. Brand, "Otis." George Bartol, General Manager; H. F. Deverell, Secretary in America; Frederick Walker, T. Frame Thomson, and J. E. Touche, Directors; B. W. Head, Secretary in England. Selling agents, Thorpe, Platt & Co., 97-103 Cedar st., New York; G. W. House, Union Trust Building, Detroit.

Sutton (The C. E.) Company, Toledo. Works built in 1890; present company organized in 1904; 3 cupolas and two 2-gross-ton Tropenas steel converters added in 1905; first blow made in June, 1905; product, general machine castings; annual capacity, 1,800 tons. Fuel, coke and oil. Also makes punches, shears, and forging machines. C. E. Sutton, President and Manager; S. D. Carr, Vice President; A. A. Barber, Secretary and Treasurer.

Toledo Works, Republic Iron and Steel Company, Pittsburgh. Works at East Toledo, Ohio.—*See page 96.*

Union (The) Rolling Mill Company, Cleveland; works and offices at Newburgh, in the city of Cleveland. Built in 1866-7; one double and 6 single puddling furnaces, 7 single scrapping furnaces, 5 heating furnaces with Duff gas producers, 4 trains of rolls, (one 3-high muck, one 18-inch bar, and one 8 and one 9-inch guide,) and one squeezer; product, nut, bolt, bridge, and rivet iron, soft steel bars, bar iron, and shafting; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 200 tons of finished iron. Fuel, coal and manufactured gas. A. S. Upson, President; A. R. Treadway, Vice President; H. A. Fuller, General Manager, Secretary, and Treasurer. Selling agents, the Bourne-Fuller Company, Cleveland, Ohio.

Wellman-Seaver-Morgan (The) Company, Cleveland. Steel casting department at Cleveland.—*See page 187.*

West (The) Steel and Iron Casting Company, East Seventieth st. and L. S. & M. S. Railway, Cleveland. Built in 1906-7 and first steel made February 17, 1907; one 3-gross-ton Tropenas converter and one Whiting cupola; product, small and medium sized steel castings; annual capacity, 1,500 tons. Fuel, oil. Ralph H. West, President, Treasurer, and Manager; Frederick Baird, Vice President; David P. Lansdowne, Secretary.

Number of rolling mills and steel works in the Lake Counties: 19. Of these 2 make Bessemer steel, 2 make Tropenas steel, 4 make open-hearth steel, one open-hearth steel plant is being added to an existing crucible steel plant, and one makes crucible steel.

HANGING ROCK DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Lawrence, Jackson, Butler, and Scioto Counties.

COKE AND BITUMINOUS COAL AND COKE FURNACES—12 COMPLETED AND 3 BUILDING.

Belfont Furnace, Belfont Iron Works Company, Ironton. One stack, 66 x 16, built in 1868; rebuilt in 1895, 1902, and 1904-5; four Whitwell stoves; fuel, Pocahontas and West Virginia coke; ores, Lake Superior and native; product, Bessemer, foundry, and forge pig iron; annual capacity, 60,000 tons. Brand, "Belfont." Selling agents, Rogers, Brown & Co., Cincinnati and branch houses.—*Active in 1907. See Belfont Iron Works, page 367.*

Bird Furnace, The Bird Iron Company, Culbertson. One stack, 67 x 15, built in 1889-90; blown in in March, 1891; rebuilt in 1901 and 1905-6; three Gordon-Whitwell-Cowper stoves; fuel, coke; ores, Lake Superior and native; product, foundry, forge, and malleable pig iron; annual capacity, 40,000 tons. Brand, "Bird." D. C. Davies, President; E. J. Bird, Vice President and General Man-

ager; Charles D. Richards, Secretary and Treasurer. Selling agents, the Robert Field Company, Cincinnati; Fieser & Bentley, Columbus. (Formerly called Lawrence Furnace and operated by the Lawrence Furnace Company; acquired by the Bird Iron Company on March 22, 1905.)—*Active in 1907.*

Globe Furnace, Globe Iron Company, Jackson. One stack, 76 x 17½, (jacket built to receive an 18½-foot bosh,) built in 1900-1 and first blown in February 12, 1901; four Foote stoves, each 75 x 18; fuel, ½ raw coal and ½ coke; ore, native, partly mined by the company; product, Jackson county silveries; specialty, ferro-silicon; annual capacity, 42,000 tons of ferro-silicon or 90,000 tons of foundry iron. Brand, "Globe." Eben Jones, President; John E. Jones, Secretary and Treasurer; E. Crandall, General Superintendent. Selling agents, Matthew Addy & Co., Cincinnati; F. A. Goodrich & Co., Detroit; J. Brooks Fenno & Co., Boston; Charles G. Shepard, Buffalo.—*Active in 1907.*

Hamilton Furnace, The Hanging Rock Iron Company, Hanging Rock. One stack, 65 x 16, built in 1883 and first blown in in March, 1886; one Whitwell and three Foote stoves; fuel, Pocahontas coke; ores, native block and limestone mined by the company and Lake Superior; product, foundry and malleable pig iron; annual capacity, 48,000 tons. Brand, "Hamilton." A machine shop is connected with the furnace. D. B. Meacham, President; Joseph K. Pollock, Vice President; Mason P. Herron, Secretary; Edwin McBirney, Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati, New York, and branch houses.—*Active in 1907.*

Hamilton Iron and Steel Company, Hamilton. Building: one stack, 80 x 18; construction commenced May 29, 1907; four Kennedy central-combustion stoves, each 94 x 20; fuel, by-product coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 100,000 tons. George L. Pearson, President; Edwin N. Ohl, Vice President; R. E. Field, Secretary and Treasurer; E. L. Phillips, Superintendent.—*Will probably be completed in 1908.*

Ironton (The) Iron Company, Ironton. Building: one stack, 75 x 18; construction commenced June 3, 1907; three Foote stoves, each 85 x 20; fuel, West Virginia coke; ore Lake Superior; product, foundry and malleable Bessemer pig iron; estimated annual capacity, 80,000 tons. Brand, "Nellie." H. A. Marting, President and General Manager; C. B. Fowler, First Vice President; W. A. Murdock, Second Vice President; W. W. Marting, Secretary and Treasurer; Charles Peters, General Superintendent. Selling agents, Matthew Addy & Co., Cincinnati and branch houses.—*Will probably be ready for operation in 1908.*

Jackson Iron and Steel Company, Jackson. Building: one stack,

75 x 17; construction commenced November 12, 1906; three Amsler hot-blast stoves, each 75 x 18; fuel, West Virginia coke and native raw coal; ores, native and Lake Superior; also mill cinder; product, high-silicon pig iron; annual capacity, 28,000 tons. Brand, "Jisco." Moses Morgan, President; D. D. Davis, Vice President; James G. Morgan, Secretary and Treasurer; Charles H. Wheeler, General Manager; Will W. Williams, Superintendent. Selling agents, Pickands, Mather & Co., Cleveland.—*Will probably be ready for operation in 1908.*

Marting (The) Iron and Steel Company, Ironton. Two alternate stacks: Alice Furnace, one stack, 86 x 18, first blown in September 13, 1875; rebuilt in 1899. Blanche Furnace, one stack, 86 x 18, first blown in in 1888; idle for several years; rebuilt in 1902-3 and blown in in 1903. Furnaces equipped with one Foote and three Whitwell stoves; fuel, New River and Pocahontas coke; ores, Lake Superior and Kentucky; product, Bessemer, foundry, and malleable pig iron; total annual capacity, 90,000 tons. Brand, "Nellie." H. A. Marting, President; C. B. Fowler, Vice President and Superintendent; E. O. Marting, Secretary and Treasurer. Selling agents, Matthew Addy & Co., Cincinnati.—*One furnace active in 1907.*

Sarah Furnace, The Kelly Nail and Iron Company, Ironton. One stack, 60 x 14, built in 1877, blown in March 18, 1878, and remodeled in 1886 and 1891; four Whitwell stoves; fuel, West Virginia coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 45,000 tons. Brand, "Sarah." Sales made by the company.—*Active in 1907. See Kelly Nail Works, pages 367-68.*

Star Furnace, Star Furnace Company, Jackson. One stack, 55½ x 14, built in 1866 and rebuilt in 1879 and 1897; three C. H. Foote stoves; fuel, about ½ native raw coal and ½ West Virginia coke; ores, native limonite and block; product, ferro-silicon, silvery softeners, and Nos. 1 and 2 soft foundry pig iron; specialty, ferro-silicon; annual capacity, 16,000 tons. Brand, "Star." Bernhard Kahn, President; Charles O. Brown, Secretary; Lewis V. Brown, Manager. Selling agents, Rogers, Brown & Co.—*Active in 1907.*

Union Furnace, Union Iron and Steel Company, New York. Furnace at Ironton, Ohio. One stack; fuel, coke.—*See page 113.*

Wellston (The) Steel and Iron Company, Wellston. Three stacks at Wellston: Wellston Furnaces, two stacks, each 52½ x 13; No. 1 built in 1874-5 and remodeled in 1879 and 1889; No. 2 built in 1874-5 and remodeled in 1889; four Thomas stoves. Milton Furnace, one stack, 62 x 13½, built in 1873-4 and first blown in June 6, 1874; rebuilt and remodeled in 1896; three Whitwell stoves. Fuel, Kanawha and Pocahontas coke; ore, Lake Superior; prod-

uct, car-wheel, strong foundry, Bessemer, and malleable pig iron; total annual capacity, 80,000 tons. M. L. Sternberger, President; H. S. Willard, Vice President; H. S. Willard, Jr., Secretary, Treasurer, and Superintendent. Selling agents, the Dombhoff and Joyce Company, Cincinnati. (Formerly operated by the Wellston Iron and Steel Company; acquired by the Wellston Steel and Iron Company on October 10, 1905.)—*All active in 1907.*

Number of coke and bituminous coal and coke furnaces in the Hanging Rock District of Ohio: 12 completed stacks and 3 stacks building. Of these 10 use coke alone, 2 coke stacks are being built, 2 use raw coal and coke mixed, and one stack to make pig iron with raw coal and coke mixed is being built.

CHARCOAL FURNACES—6.

Bloom Furnace, The Clare Iron Company, Portsmouth. Furnace at Bloom Switch, Scioto county. One stack, 35 x 10, built in 1832 and rebuilt in 1846; burned December 7, 1888, and rebuilt in the spring of 1889; again rebuilt in 1901; hot blast; open top; ore, hematite; product, No. 1 foundry pig iron; annual capacity, 2,700 tons. Brand, "Bloom." Charcoal pits with an annual capacity of 200,000 bushels are connected with the furnace. E. H. Clare, President and Selling Agent; J. R. Clare, Vice President; E. S. Clare, Secretary and Treasurer.—*Last active in 1904.*

Center Furnace, The Superior Portland Cement Company, Superior P. O., Lawrence county. One stack, 40 x 10½, built in 1837; open top; ore, native limestone, chiefly mined by the company; product, pig iron especially adapted for cylinders, pulleys, and all kinds of machinery where strength is required; annual capacity, 4,500 tons. Brand, "Center." Charcoal pits with an annual capacity of 200,000 bushels are connected with the furnace; also a plant for the manufacture of cement from rock, with a daily capacity of 2,000 barrels. Justus Collins, President, and J. A. Lathim, Secretary and Treasurer, Charleston, W. Va.; M. L. Sternberger, Vice President, Jackson, Ohio; J. B. John, Manager, Superior, Ohio. (Formerly operated by Mrs. Nannie H. Kelley; acquired by the present company on July 1, 1906.)—*Active in 1907.*

Hecla Furnace, Hecla Iron and Mining Company, Ironton, R. F. D. Route No. 2. One iron stack, 53 x 10, (diameter of jacket, 21 feet,) built in 1887-90 to take the place of a stone stack built in 1833; two Player hot-blast ovens; cold or warm blast; ores, local; product, iron for car wheels, chilled rolls, and machinery; annual capacity, 7,500 tons. Brand, "Hecla." Charcoal pits are connected with the furnace. Stops on Sunday. Mrs. Alice Campbell Anderson, President, and Charles Campbell, Secretary,

Treasurer, and General Manager, Ironton; Albert Campbell, Vice President, Washington, D. C. Sales made by the company. (Formerly operated under lease by the Hecla Charcoal Iron Company.)—*Last active in 1904.*

Jefferson Furnace, Jefferson Iron Company, Oak Hill. One stack, 40 x 10½, built in 1854; idle for several years; revived in 1901; warm blast; ores, native limestone and block from the company's mines; product, foundry pig iron; annual capacity, 3,500 tons. Brand, "Anchor." Charcoal pits are connected with the furnace. J. J. Thomas, President; Joseph J. Jones, Secretary; W. E. Davis, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; J. H. Hillman & Co., Pittsburgh.—*Active in 1907.*

Olive and Buckhorn Furnaces, The McGugin Iron and Coal Company, Olive Furnace, Lawrence county; telegraph address, Moulton, care of C., H., & D. Ry. Furnaces situated on the Cincinnati, Hamilton, and Dayton Railway. Two stacks: Olive Furnace, 40 x 10, built in 1846 and remodeled in 1890; Buckhorn Furnace, 38 x 10, built in 1833 and rebuilt in 1852. Open tops; hot or cold blast; ore, native limestone from the furnace property; product, foundry, car-wheel, and machinery pig iron; total annual capacity, 8,000 tons. Brands, "Olive" and "Buckhorn." Charcoal pits are connected with the furnaces. W. N. McGugin, President; W. H. McGugin, Secretary and Treasurer. Sales chiefly made by the company.—*Olive active in 1907; Buckhorn idle since 1884.*

Number of charcoal furnaces in the Hanging Rock District: 6.

Total number of furnaces in this District: 18 completed stacks and 3 stacks building. Of these 10 use coke, 2 coke stacks are being built, 2 use raw coal and coke mixed, one raw coal and coke mixed stack is being built, and 6 use charcoal.

ROLLING MILLS AND STEEL WORKS—3.

Belfont Iron Works, Belfont Iron Works Company, Ironton. Built in 1852; 4 gas heating furnaces, one train of rolls, 126 cut-nail machines, 40 wire-drawing blocks, and 65 wire-nail machines; product, plain wire, galvanized and plain black fence wire, barbed wire, wire nails, and cut nails; annual capacity, 300,000 kegs of cut nails and 500,000 kegs of wire nails. Fuel, bituminous coal and natural gas. Brand, "Belfont." A galvanizing plant is connected with the works; also a machine shop. B. H. Burr, President and General Manager; Robert Peebles, Vice President; S. G. Gilfillan, Secretary and Treasurer.—*See Belfont Furnace, page 363.*

Kelly Nail Works, The Kelly Nail and Iron Company, Ironton. Built in 1883 and first put in operation November 1, 1883; 2 gas heating furnaces, 2 forge fires, one 2-high 22-inch train of plate

rolls, 42 wire-drawing blocks, 61 wire-nail machines, and 120 cut-nail machines; product, steel cut nails and spikes, wire nails, staples, plain and galvanized wire, and barbed wire; annual capacity, 250,000 kegs of cut nails, 30,000 tons of wire, 8,000 tons of barbed wire, and 700,000 kegs of wire nails. Fuel, coal and manufactured gas. Brand, "The Ironton Nail." A galvanizing plant is connected with the works. Oscar Richey, President and General Manager; Ironton A. Kelly, Vice President; T. J. Hayes, Secretary and Treasurer.—*See Sarah Furnace, page 365.*

Portsmouth Steel Company, City Bank Building, Wheeling, W. Va. Works at Portsmouth, Ohio. Built in 1871; destroyed by fire in June, 1898, rebuilt in 1898-9, and put in operation in April, 1899; works now equipped with five 40-gross-ton open-hearth steel furnaces, (one acid and 4 basic), the necessary soaking pits, one blooming mill, one 28 x 60-inch jobbing mill, and one 3-high 30 x 84-inch plate mill; first acid and basic steel made in April, 1899; iron and steel foundries are connected with the works; product, steel ingots, steel castings, billets, slabs, heavy and light plates, and heavy sheets; annual capacity, 75,000 tons of basic ingots, 25,000 tons of acid ingots, 600 tons of steel castings, 100,000 tons of billets and slabs, 50,000 tons of heavy plates, 10,000 tons of light plates and heavy sheets, and 10,000 tons of tie plates; also 600 tons of iron castings. Fuel, natural gas. W. L. Glessner, President; Alex. Glass, Vice President; Donald S. Drennen, Secretary. Number of rolling mills and steel works in the Hanging Rock District of Ohio: 3. Of these one makes open-hearth steel.

INTERIOR COUNTIES.

Embraces Blast Furnaces, Rolling Mills, Steel Works in Franklin, Perry, Tuscarawas, Muskingum, Butler, Guernsey, Stark, Summit, Huron, Marion, Richland, Licking, Allen, Crawford, and Miami Counties.

COKE AND BITUMINOUS COAL AND COKE FURNACES—7.

Bessie Furnace, Bessie Ferro-Silicon Company, lessee, Harrison Building, Columbus; New York offices, 31 Nassau st. Furnace at New Straitsville, Perry county. One stack, 60 x 14, built in 1877-8 and blown in in 1878; four Whitwell stoves; fuel, West Virginia coke and Hocking Valley coal; ore, Lake Superior low-phosphorus; product, ferro-silicon; annual capacity, 18,000 tons. Brands, "Bessie" and "Pencost." L. C. Lathrop, President, and Eugene Lucas, Secretary and Treasurer, New York; Robert A. Magly, General Manager, Columbus. (Owned by the Columbus and Hocking Coal and Iron Company, Columbus; formerly operated under lease by Fieser & Bentley; leased by the present company in 1905.)—*Active in 1907.*

Columbus Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Two furnaces at Columbus; fuel, coke.—*See page 7.*

Columbus (The) Iron and Steel Company, Columbus. Two stacks, each 75 x 17, one built in 1900 and blown in in October, 1900; the other built in 1900-1 and blown in in February, 1901; eight Foote stoves; fuel, West Virginia and Connellsville coke; ore, Lake Superior, chiefly mined by the company; product, Bessemer, basic, malleable, and foundry pig iron; total annual capacity, 150,000 tons. Brand, "Buckeye." Two slag and cinder removing machines for the production of granulated slag are connected with the furnaces. Also operates 100 coke ovens at Marting, W. Va. J. G. Battelle, President, James Clare Miller, Secretary, and J. H. Frantz, Treasurer and General Manager, Columbus; H. A. Marting, Vice President, Ironton.—*Both active in 1907.*

Dover Furnace, The Penn Iron and Coal Company, Canal Dover; Cleveland offices, Perry-Payne Building. One stack, 85 x 20, built in 1854 and blown in in 1855; rebuilt in 1878-9 and remodeled and enlarged in 1895; again rebuilt in 1902-3; three Cowper-Roberts fire-brick stoves, each 70 x 18, and one Foote stove, 75 x 19; fuel, coke; ores, blackband and Lake Superior; specialties, "Tuscarawas" blackband, "Dover" all-lake ore strong foundry, and Bessemer and basic open-hearth pig iron; annual capacity, 146,000 tons. Equipped with one Davies pig-iron casting machine. D. R. Hanna, President; F. B. Richards, Vice President; R. L. Ireland, Treasurer; M. McMurray, General Manager; H. S. Ream, Secretary; P. J. Conlin, Superintendent. Sole selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1907.*

Zanesville Furnace, Carnegie Steel Company (of New Jersey). Furnace at Zanesville, Ohio. One stack; fuel, coke.—*See page 10.*

Number of coke and bituminous coal and coke furnaces in Ohio outside of the Mahoning Valley, Lake Counties, Ohio River Counties, and the Hanging Rock District: 7 stacks. Of these 6 use coke alone and one uses bituminous coal and coke mixed.

BLOOMARIES—1.

Dover Forge, The Dover Forge and Iron Company, Canal Dover. Construction commenced in 1903; completed and put in operation October 19, 1904; 8 knobbling fires and one 5,000-lb. steam hammer; product, charcoal blooms for the company's use and for sale made from charcoal pig iron and scrap; annual capacity, 12,000 tons. Fuel, charcoal. Selling agents, E. W. Mudge & Co., Pittsburgh.—*See Dover Rolling Mill, pages 371-72.*

Number of iron bloomaries in the Interior Counties of Ohio which make charcoal blooms for sale: one.

ROLLING MILLS AND STEEL WORKS—31 COMPLETED AND 1
PARTLY ERECTED.

Alliance Works, American Steel Foundries, Chicago. Works at Alliance, Ohio.—*See page 126.*

Berger (The) Manufacturing Company, Canton; branch offices, 112 Bedford street, Boston; corner Eleventh avenue and Twenty-second street, New York; 1034 Washington avenue, Philadelphia; 1401 Monadnock Building, Chicago; 1213 Pine st., St. Louis; Minneapolis, Minn.; and 1357 Mission st., San Francisco. Built in 1900-1 and enlarged in 1906-7, using a part of the machinery with which the works of the Waukesha Sheet Steel Company, at Waukesha, Wisconsin, were formerly equipped; first put in operation October 1, 1901; 2 pile, 2 busheling, 2 scrap, 12 sheet, 12 pair, and 17 annealing furnaces, one squeezer, 11 hot trains of rolls, (four 34, six 38, and one 44-inch,) five 48-inch cold trains, two 30-ton Morgan cranes, and six 126-inch shears; product, black and galvanized sheet steel and iron sheets for tinning; annual capacity, 50,000 tons. Fuel, producer gas, bituminous coal, and coke. Edward A. Langenbach, President and General Manager; F. H. Snyder, Vice President; C. A. Irwin, Secretary and General Superintendent; F. A. Schwertner, Treasurer. (Formerly owned and operated by the Stark Rolling Mill Company; acquired by the Berger Manufacturing Company on January 1, 1906.)

Bonney-Floyd (The) Company, Columbus. Works at South Columbus, on the Toledo and Ohio Central Railroad. Built in 1907; one 3-gross-ton side-blown converter with one cupola; first steel made on September 16, 1907; product, small and medium weight steel castings; annual capacity, 3,600 tons. Fuel, natural gas. John L. V. Bonney, President and Treasurer, and Walter B. Floyd, Vice President, Secretary, and Manager.

Bucyrus (The) Steel Casting Company, Bucyrus. Built in 1906-7; two 20-gross-ton special basic open-hearth steel furnaces and 5 heating pits; first steel made March 14, 1907; product, steel castings; annual capacity, 30,000 tons. Fuel, oil. P. J. Carroll, President and General Manager; F. P. Donnenwirth, Vice President; W. A. Blicke, Secretary and Treasurer; C. E. Lyons, Manager. Western selling agent, C. F. Ames, Great Northern Building, Chicago.

Byesville Works, The United Sheet and Tin Plate Company, Marietta. Partly erected works at Byesville. Work suspended in 1903.—*See page 185.*

Cambridge Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cambridge, Ohio.—*See page 56.*

Cambridge Works, Interstate Iron and Steel Company, Chicago.

Works at Cambridge, Ohio. (Formerly owned and operated by the Cambridge Rolling Mill Company; later operated under lease by the Blondell Steel Company.)—*See pages 208-9.*

Canton Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Canton, Ohio. (Formerly operated by the Canton Steel Company.)—*See pages 163-64.*

Canton Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Canton, Ohio.—*See pages 56-57.*

Carnahan Tin Plate and Sheet Company, Canton. Built in 1900-1 and first put in operation in the winter of 1901-2; 6 heating and 5 annealing furnaces, 2 forge fires, one 26-inch bar mill, and 12 sheet mills (two 26 x 32 and four 26 x 30-inch hot and six 22 x 34-inch cold, arranged tandem); product, black plates for tinning, stamping sheets, etc.; annual capacity, 22,000 tons. A forge, added in 1905, contains 6 knobbling fires and one charcoal refining fire; first blooms made in April, 1905; product, charcoal blooms made from charcoal pig iron and iron and steel scrap; annual capacity, 5,400 tons, all consumed by the company in the manufacture of roofing plates. Fuel, coal and producer gas. J. E. Carnahan, President; Edward A. Langenbach, Vice President; W. M. Blecker, Secretary, Treasurer, and General Manager. Sales agencies, 1123 Broadway, New York; Stephen Girard Building, Philadelphia; 604 Missouri Trust Building, St. Louis; 516 Folsom st., San Francisco.—*See Tinplate and Terne Plate Works, Part III.*

Christy (The) Steel Company, Akron. Built in 1907 and first steel made in July, 1907; six 8-pot crucible steel-melting furnaces; product, castings for automobile and machine parts; estimated annual capacity, 600 tons. Fuel, oil. F. D. Kidder, President; James Christy, Vice President; A. K. Kronk, Secretary; James W. Orr, Treasurer and General Manager.

Columbus Iron Works, Standard Chain Company, Pittsburgh. Works at Columbus, Ohio.—*See page 182.*

Columbus Steel Works, Carnegie Steel Company (of New Jersey), Carnegie Building, Pittsburgh. Works at Columbus, Ohio.—*See page 11.*

Corns Works, Republic Iron and Steel Company, Pittsburgh. Works at Massillon, Ohio.—*See page 95.*

Dover Rolling Mill, The Dover Forge and Iron Company, Canal Dover. Construction commenced in 1903; put in operation October 13, 1904; 2 double puddling furnaces, one scrap furnace, 2 heating furnaces, one squeezer, and one 3-high 20-inch skelp mill with roughing and finishing stands; product, iron forging billets, iron sheet bars, charcoal iron tinplate bars, and charcoal iron

skelp; annual capacity, 15,000 tons of billets and bars and 10,000 tons of skelp. Fuel, coal. A forge for the manufacture of charcoal blooms is connected with the works. A. J. Krantz, President; James Rees, Vice President; J. A. Krantz, Secretary and Treasurer. Selling agents, E. W. Mudge & Co., Pittsburgh.—*See Dover Forge, page 369.*

Dover Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Canal Dover, Ohio.—*See page 57.*

Dresden Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Dresden, Ohio.—*See page 57.*

Falls Hollow Staybolt Company, Cuyahoga Falls. Built in 1865, rebuilt in 1884, and remodeled in 1903; 2 heating furnaces and 2 trains of rolls (one 10 and one 22-inch); product, hollow and solid staybolt bars made from the best quality of double refined charcoal iron or steel; annual capacity, 2,000 tons. Fuel, oil. Brands, "Falls Hollow Staybolt Iron," "Falls Solid Staybolt Iron," and "Falls Hollow Staybolt Steel." C. M. Walsh, Proprietor and General Manager. Selling agents, John Livingstone, 56 Royal Insurance Building, Montreal, Canada; Scully Steel and Iron Company, Halsted, Fulton, and Wayman sts., and A. M. Castle & Co., 55-59 North Jefferson st., Chicago; Benjamin C. Bradford, Pioneer Press Building, St. Paul, Minn.; Southwestern Engineering Supply Company, St. Louis; John Hickey, Salt Lake City, Utah; Berger-Carter Company, Seventeenth and Mississippi sts., San Francisco.

Guernsey Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at Cambridge, Guernsey county, Ohio.—*See page 58.*

Marion (The) Steam Shovel Company, Marion. Steel department built in 1900-1 and first steel made in February, 1901; one 1½-gross-ton Robert-Bessemer converter; product, steel castings, all consumed by the company in the manufacture of steam shovels, dredgers, ditchers, ballast unloaders, etc.; annual capacity, 2,400 tons. Fuel, coke. George W. King, President and General Manager, A. E. Cheney, Secretary and Sales Manager, and Frank A. Huber, Vice President and Treasurer, Marion; George W. Barnhart, Pacific Coast Manager, San Francisco.

Middletown Branch, The American Rolling Mill Company, Middletown.—*See page 186.*

Muskingum Branch, The American Rolling Mill Company, Middletown. Works at Zanesville. (Formerly operated by the Muskingum Valley Steel Company.)—*For a complete description of these works see page 186.*

Newark Steel Plant, The Ohio Rail Company, Newark; branch

offices, Park Building, Pittsburgh. Originally built in 1897 and enlarged in 1901; open-hearth steel furnace added in 1901 and first steel made August 1, 1901; acquired by the Ohio Rail Company in 1907 and rebuilt in that year; now equipped with one continuous rail heating furnace, one 3-high 18-inch rail train, and two 10-ton hand cranes; product, rerolled steel rails; first rail rerolled on August 22, 1907; annual capacity, 36,000 gross tons. Fuel, natural gas. L. B. Foster, President, Pittsburgh; H. N. Bernheimer, Secretary, and Lambert B. Richards, Vice President and Treasurer, Newark. Selling agents, L. B. Foster Company, Park Building, Pittsburgh. (One 10-gross-ton acid open-hearth furnace, built in 1901, dismantled in 1907. Formerly operated by the Newark Iron and Steel Company; acquired by the present company on January 20, 1907.)

New Philadelphia Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at New Philadelphia, Ohio.—*See pages 59-60.*

Norwalk (The) Steel and Iron Company, (Incorporated,) Norwalk; branch offices, Rookery Building, Chicago. Built in 1902-3 and first put in operation in 1903; two 20-gross-ton modified stationary basic open-hearth steel furnaces, 8 heating furnaces, 2 annealing furnaces, 2 trains of rolls, (one 12-inch bar and one 24-inch plate,) 5 hammers, 2 electric cranes, 3 heavy double and 3 single shears, and two 6-pot crucible furnaces; first open-hearth steel made March 16, 1903, and first crucible steel in June, 1907; product, open-hearth steel ingots, crucible steel ingots, hammered and rolled machinery steel, spring steel, plow steel, die blocks, discs, tool steel, alloy steel, etc.; annual capacity, 26,000 tons of open-hearth steel ingots, 600 tons of crucible steel ingots, 21,600 tons of rolled products, and 3,000 tons of forged products. Fuel, natural gas. Brand, "Norwalk." Oliver H. Lau, Detroit, Michigan, and H. Lindale Smith, Cleveland, Ohio, Receivers. Branch agencies, Rookery Building, Chicago; Walter Graham, Harrison Building, Philadelphia; William P. Stanton, 133 Bank st., Cleveland; Edwin R. Kent & Co., 8-10 South Canal st., Chicago, 51 John st., New York, and 36 Thoms Building, Cincinnati; Charles H. Smith, 728 North First st., St. Louis, Missouri; Louisville Selling Company, Board of Trade Building, Louisville, Kentucky.

Ohio (The) Steel Foundry Company, Lima. Built in 1907 and first steel made September 21, 1907; two stationary open-hearth steel furnaces (one 15-gross-ton acid and one 15-gross-ton basic) and 2 annealing pits; product, steel castings; estimated annual capacity, 12,000 tons. Fuel, oil. Harry Wright, President, and John

- E. Galvin, Vice President, Lima, Ohio; John W. Kaufman, Secretary and Treasurer, Columbus, Ohio.
- Piqua Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Piqua, Ohio.—*See page 60.*
- Shelby Works, (Factory A,) Shelby Steel Tube Company, Pittsburgh. Works at Shelby, Ohio.—*See page 40.*
- Shull (The) Steel Castings and Manufacturing Company, Canton. Built in 1907; one 15-gross-ton Siemens acid open-hearth steel furnace; product, machine steel castings; annual capacity, 10,000 tons. Fuel, natural and producer gas. William Rommel, President; George Edel, Vice President; L. E. Shull, Secretary; Frank C. Wise, Treasurer; E. G. Van Horn, General Manager.
- South Plant, The Buckeye Steel Castings Company, Columbus. Steel-casting plant on South Parsons ave., built in 1901-2 and first steel made in November, 1902; 5 basic open-hearth steel furnaces (one 12 and four 20-gross-ton); product, car couplers, car bolsters, truck frames, and general railroad castings; annual capacity, 45,000 tons. Fuel, natural gas. S. P. Bush, President and General Manager, R. S. Warner, Vice President, Arno Eberlein, Secretary and Treasurer, and George G. Merring, Auditor, Columbus; Frank Rockefeller, Second Vice President, Garfield Building, Cleveland. Selling agents, Julian L. Yale & Co., Railway Exchange Building, Chicago; George Groobey, Atlanta.
- Tuscora Works, The United Sheet and Tin Plate Company, Marietta. Works at New Comerstown.—*See page 185.*
- United (The) Steel Company, Canton. Built in 1903-4 and first put in operation in 1904; three 50-gross-ton Siemens basic open-hearth furnaces, two 4-hole soaking pits, one 2-hole heating oven, one 48-inch universal mill, and one 50-inch 7-roll straightening machine; first open-hearth steel made in July, 1904, and first products rolled in August, 1904; product, ingots, slabs, billets, sheet bars, universal mill plates, skelp, and forging ingots; also makes high-manganese, vanadium, and chrome steel for automobiles; annual capacity, 75,000 tons of ingots and 150,000 tons of rolled products. Fuel, natural and producer gas. J. E. Carnahan, President; Joseph Biechele, Vice President; Edward A. Langenbach, General Manager; Harry R. Jones, Secretary and Treasurer.
- Number of rolling mills and steel works in the Interior Counties of Ohio: 31 completed and one partly erected. Of these one makes standard Bessemer steel, one makes Robert-Bessemer steel, and one makes side-blown Bessemer steel; 9 make open-hearth steel and one open-hearth steel plant is partly erected; and 2 make crucible steel.

OHIO RIVER COUNTIES.

Embraces Furnaces, Rolling Mills, and Steel Works in Belmont, Jefferson, Hamilton, and Washington Counties and part of Columbiana County.

COKE FURNACES—10.

Bellaire Furnaces, Carnegie Steel Company (of New Jersey), Pittsburgh. Furnaces at Bellaire. Two stacks; fuel, coke.—*See page 6.*
La Belle Furnaces, La Belle Iron Works, Steubenville. Two stacks; fuel, coke.—*See page 183.*

Martins Ferry Furnace, Wheeling Steel and Iron Company, Wheeling, West Virginia. One furnace at Martins Ferry; fuel, coke.—*See page 189.*

Mingo Furnaces, Carnegie Steel Company (of New Jersey). Four furnaces at Mingo Junction; fuel, coke.—*See pages 8-9.*

Steubenville Furnace, Carnegie Steel Company (of New Jersey), operators, Pittsburgh. Furnace at Steubenville. One stack; fuel, coke. (Owned by the National Tube Company.)—*Pages 10 and 37.*

Number of coke furnaces in the Ohio River Counties: 10 stacks.

ROLLING MILLS AND STEEL WORKS—12 COMPLETED AND
1 PARTLY ERECTED.

Aetna-Standard Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Bridgeport, Ohio.—*See page 56.*

Bellaire Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Bellaire, Ohio.—*See pages 10-11.*

Cincinnati (The) Horse Shoe and Iron Company, Traction Building, Cincinnati. Works at Hooven. Built in 1906 and first put in operation September 26, 1906; 3 heating furnaces, 2 trains of rolls, (one 9 and one 16-inch,) and horseshoe machines; product, iron and steel bars and horse and mule shoes; annual capacity, single turn, about 18,000 tons of bars and 180,000 kegs of shoes. Fuel, coal. C. E. Hooven, President, Hamilton; H. Lee Early, Vice President, Frank C. Graham, Secretary, and W. C. Renaker, Treasurer, Cincinnati; William Eynon, General Manager, Cleves, Ohio. (Built and formerly operated by the Graham-Phillips Horse Shoe and Iron Company; acquired by the Cincinnati Horse Shoe and Iron Company on May 20, 1907.)

Laughlin Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Martins Ferry, Ohio.—*See page 58.*

Lunkenheimer (The) Company, Cincinnati; branch offices, 66-68 Fulton st., New York. Built in 1901 to manufacture valves and steam fittings; two $\frac{1}{2}$ -ton special steel furnaces added in 1905; first steel made in December, 1905; product, valves and other steam fittings; annual capacity, 1,200 tons. Fuel, crude oil. Proposes adding two 2-gross-ton Tropenas converters. Edward H.

Lunken, President; Samuel L. Moyer, Vice President and General Manager; David C. Jones, Secretary and Purchasing Agent; William H. Muench, Treasurer.

Marietta Works, The United Sheet and Tin Plate Company, Marietta.—*See page 185.*

Martins Ferry Department, Whitaker-Glessner Company, Wheeling, West Va. Works at Martins Ferry, Ohio. (Formerly called the Laughlin Department.)—*See page 188.*

Mingo Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Mingo Junction, Ohio.—*See page 15.*

Pope Tin Plate Company, Wheeling, W. Va.; branch offices, 421 Wood st., Pittsburgh. Works at Steubenville. Built in 1901-2 and first put in operation in July, 1902; 12 pair furnaces, 12 sheet heating furnaces, 4 annealing furnaces, 12 stands of 26-inch hot rolls, and 10 stands of 22-inch cold rolls; product, black plates or sheets for tinning; annual capacity, about 35,000 tons. Fuel, coal and natural gas. Charles E. Pope, President; John F. Kraft, Secretary and Treasurer.—*See Tinplate and Terne Plate Works, Part III.*

Steel (The) Foundry Company, Cincinnati, Ohio. Works built in 1906; 2 open-hearth steel furnaces (one 15-gross-ton acid and one 20-gross-ton basic); first acid open-hearth steel made June 14, 1906, and first basic open-hearth steel made July 15, 1906; product, all kinds of steel castings; annual capacity, 6,000 tons of acid and 8,000 tons of basic castings. Fuel, oil. William B. Melish, Receiver, 612 West Sixth st., Cincinnati.

Steubenville Works, La Belle Iron Works, Steubenville.—*See pages 183-84.*

Wellsville Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wellsville, Ohio.—*See page 62.*

PARTLY-ERECTED STEEL WORKS.

Menough (The) Foundry Company, Incorporated, Wellsville. Now makes light and heavy gray iron castings; one 2-gross-ton side-blown Adams steel converter partly erected in 1905; work indefinitely postponed; if completed light and heavy steel castings will be made; estimated annual capacity, from 3,000 to 5,000 tons. G. W. Menough, President; A. G. Menough, Secretary and Treasurer; H. S. Menough, General Manager.

Number of rolling mills and steel works in the Ohio River Counties: 12 completed and one partly erected. Of these 2 make Bessemer steel, one plant has a partly-erected Adams converter, one existing steel-casting plant may add Tropenas converters, 2 make open-hearth steel, and one makes special steel.

SUMMARY FOR OHIO.

Total number of blast furnaces in Ohio: 66 completed, 9 building, and 4 projected. Of these 57 use coke alone, 8 coke stacks are being built, and 4 coke stacks are projected; 3 stacks use bituminous coal and coke mixed, one bituminous coal and coke stack is being built, and 6 stacks use charcoal.

Number of iron bloomaries in Ohio which make charcoal blooms for sale: one.

Total number of rolling mills and steel works in Ohio: 80 completed and 2 partly erected. Of these 8 make standard Bessemer steel, one makes Robert-Bessemer steel, 2 make Tropenas steel, one Tropenas steel plant is projected, one makes side-blown steel, and one plant to make Adams side-blown steel is partly erected; 17 make open-hearth steel, 2 open-hearth steel plants are being built, and one open-hearth steel plant is partly erected; 3 plants make crucible steel; and one plant makes special steel castings.

INDIANA.

COKE FURNACES—1 COMPLETED, 4 BUILDING, AND 13 PROJECTED.

Gary Furnaces, Indiana Steel Company, Chicago. Furnaces at Gary. Four building and 12 projected furnaces; fuel, coke.—*For a description of these furnaces see page 30.*

Inland Furnace, Inland Steel Company, Chicago. One furnace at Indiana Harbor, Indiana. Fuel, coke. A twin coke furnace is projected.—*See page 207.*

Number of coke furnaces in Indiana: one completed, 4 building, and 13 projected. There are no charcoal furnaces in this State.

ROLLING MILLS AND STEEL WORKS—26 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

American Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Elwood, Indiana.—*See page 56.*

Anderson Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Anderson, Indiana.—*See page 56.*

Anderson Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Anderson, Indiana.—*See pages 43-44.*

Atlanta Tin Plate and Sheet Mill, Indianapolis. Works at Atlanta. Construction commenced in 1903; first put in operation September 27, 1906; 4 sheet and 4 pair heating furnaces, 2 annealing furnaces, 4 hot black plate mills, (two 32 and two 36-inch,) and four 34-inch cold mills; product, sheets and black plates for tinning; annual capacity, 14,000 tons. Fuel, coal. A galvanizing department is connected with the works. Edward L. McKee, President,

H. B. Hibben, Vice President, and Edward B. Porter, Secretary and Treasurer, Indianapolis; Edward Fox, General Manager, Atlanta. Selling agents, E. R. Hensel, Security Building, St. Louis; Theodore Geissmann & Co., Commercial National Bank Building, Chicago; W. S. Weyer, Baird Building, Kansas City, Missouri; C. W. Pike Company, 9 Mission st., San Francisco. (Partly built by the Atlanta Rolling Mill and Tin Plate Company; acquired by the Atlanta Tin Plate and Sheet Mill in July, 1906, which completed and put the works in operation.)

East Chicago Works, Interstate Iron and Steel Company, Chicago. Works at East Chicago, Indiana. (Formerly called the Emlyn Iron Works.)—*See page 209.*

Elwood Plant, Ames Shovel and Tool Company, Boston. Works at Elwood, Indiana.—*See page 178.*

Fort Wayne (The) Rolling Mill Company, Fort Wayne. Built in 1903; first put in operation December 23, 1903; 3 double puddling furnaces, 2 single scrap furnaces, one double scrap furnace, 4 gas heating furnaces, one gas pile-on-board furnace, one direct-fire heating furnace, and 4 trains of rolls (one 20-inch muck, one 18-inch bar, and one 8 and one 9-inch guide); product, bar and band iron, $\frac{1}{4}$ of an inch to 4-inch rounds and squares, $\frac{3}{8}$ of an inch by No. 16 to 10-inch by $1\frac{1}{2}$ -inch flats; also ovals, wagon-box iron, etc.; annual capacity, 55,000 tons. Brand, "Wayne Special." Fuel, producer gas. Edward F. Yarnelle, President; H. C. Rockhill, Vice President, Treasurer, and General Manager; Moie Cook, Secretary. Representatives, P. H. Joyce, The Temple, Chicago; Louis Keller, 401 North Second st., St. Louis. (Formerly operated by the Fort Wayne Iron and Steel Company; acquired by the present company on January 1, 1906.)

Gary Steel Works and Rolling Mills, Indiana Steel Company, Chicago. Building works at Gary.—*See pages 30-31.*

Haskell and Barker Car Company, Michigan City. Built in 1852; open-hearth furnaces added about 1890; 3 cupolas, 24 gas producers, 30 annealing furnaces, four 10-ton air furnaces, three 10 and three 25-gross-ton acid open-hearth steel furnaces, and 2 oil furnaces; product, car wheels, gray iron castings, and malleable iron castings; could make open-hearth steel castings; annual capacity, 150,000 car wheels, 15,000 tons of gray iron castings, and 39,000 tons of malleable iron castings. Fuel, producer gas. Also builds freight cars. John H. Barker, President; W. J. McBride, Vice President; Charles Porter, Secretary.

Highland (The) Iron and Steel Company, Terre Haute. Built in 1901 and first put in operation November 25, 1901; 8 double

puddling furnaces, 4 single scrap furnaces, 5 heating furnaces, and 3 trains of rolls (one combined 10 and 12-inch Belgian, one 20-inch finishing, and one 20-inch muck); product, iron and steel merchant bars and special shapes; annual capacity, 50,000 tons. Fuel, bituminous coal. Philip Matter, President; John L. Smith, Vice President; William M. Myers, Secretary; Walter C. Ely, Treasurer and General Manager.

Indiana Harbor Works, American Steel Foundries, Chicago. Works at Indiana Harbor, Indiana.—*See page 126.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana.—*See pages 207-8.*

Indiana Rolling Mill Company, New Castle. Built in 1902-3 and first put in operation June 1, 1903; 4 billet and sheet heating furnaces and 3 trains of rolls (one 22-inch bar, one 22-inch plate, and one 22-inch finishing); product, high-carbon sheet steel for shovel plates; annual capacity, from 8,000 to 10,000 tons. Fuel, natural gas. A department for the manufacture of shovels is connected with the works; also a department for the manufacture of harrow and grain drill discs up to 20 inches in diameter; also a machine shop for the use of the company. C. W. Mouch, President and Manager; E. N. Bundy, Vice President; J. T. Myler, Secretary; D. W. Kinsey, Treasurer. Selling agent, James O'Donnell, 36 La Salle st., Chicago.

Inland Works, Republic Iron and Steel Company, Pittsburgh. Works at East Chicago, Indiana.—*See page 95.*

Kokomo Steel and Wire Company, Kokomo. Works for the manufacture of wire and wire nails built in 1900; wire rod train, with a daily capacity of 250 tons, added in 1902; first rods rolled November 17, 1902; 106 wire-drawing blocks and 85 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 75,000 tons of rods, 67,500 tons of wire, and 1,000,000 kegs of nails. Fuel, coal. A. A. Charles, President; A. V. Conratt, Vice President; J. E. Fredrick, Secretary; G. W. Charles, Treasurer.

Linton (The) Rolling Mill Company, Linton. Construction commenced September 1, 1906; completed and put in operation March 1, 1907; one continuous heating furnace, 32 x 16 feet, and 2 trains of rolls (one 10 and one 20-inch); product, 12, 16, 20, 25, 30, 35, and 40-lb. steel rails; also splices and railroad spikes; annual capacity, 60,000 tons of rails, 1,500 tons of splices, and 7,500 kegs of spikes. Fuel, bituminous coal. Job Freeman, President and General Manager; W. J. Hamilton, Vice President; Joe Moss, Treasurer; P. F. Freel, Secretary.

Matthews Works, Armor Steel and Foundry Company, Marquette Building, Chicago. Works at Matthews, Indiana. Built in 1902-3

and first steel made March 7, 1903; one 10-gross-ton Siemens acid open-hearth steel furnace; product, machinery castings; also special castings by the "Gebhard" process; annual capacity, 3,000 tons. Fuel, oil. William S. Freeman, President, and John R. Case, Secretary and Treasurer, Chicago. (Formerly operated by the Matthews Steel Casting Company; later by the Electric Steel Casting Company; acquired by the Armor Steel and Foundry Company on February 1, 1907.)

Midland Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Muncie, Indiana.—*See page 59.*

Morewood Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Gas City, Indiana.—*See page 59.*

Muncie Works, American Rolling Mill Corporation, 607 Great Northern Building, Chicago. Works at Muncie. Built in 1888-9 with part of machinery removed from Greencastle, Indiana; put in operation in March, 1889; rebuilt in 1899; remodeled and enlarged and partly rebuilt in 1901-2; 8 busheling furnaces, one single puddling furnace, one double puddling furnace, 4 heating furnaces, and 3 trains of rolls (one 7-inch, one 10-inch with auxiliary roughing train, and one 2-high 18-inch muck); product, bar and band iron and steel; annual capacity, 36,000 tons. Fuel, bituminous coal. D. M. Cohen, Trustee.—*See Robey Street Works in Illinois, page 388.*

National Car Coupler Company, Monadnock Building, Chicago. Works at Attica, Indiana. Built in 1906-7; one 15-gross-ton acid open-hearth steel furnace; first steel made May 18, 1907; product, freight and passenger car couplers, small couplers for industrial cars, centering yokes, steel platforms, platform buffers, Hinson draft rigging, and emergency knuckles; specialty, small castings from 1 lb. to 500 lbs.; annual capacity, 9,000 tons. Fuel, oil and coal. J. W. Harrison, President and General Manager, Attica; H. L. Bailey, Vice President, Cyrus W. George, Secretary, Charles A. Nowak, Treasurer, and S. W. Midgeley, General Sales Manager, Chicago. (Company formerly operated one 12-gross-ton acid open-hearth steel furnace at Converse, Indiana, which was dismantled in 1906.)

National Rolling Mill Company, Vincennes. Built at Hartford City, Ind., in 1901 and put in operation September 30, 1901; removed to Vincennes in 1903-4 and put in operation February 15, 1904; 6 scrapping, 3 cinder-bottom, and 4 heating furnaces and 3 trains of rolls (one 18-inch muck and one 8-inch and one 10-inch finishing); product, scrap bar and finished iron and steel bars; annual capacity, 20,000 tons of scrap bars and 20,000 tons of finished bars. Fuel, bituminous coal. A machine shop is con-

nected with the works. Isaac Lyons, President; H. Brokhage, Vice President; J. H. Jones, Secretary; H. J. Boeckmann, Treasurer; S. N. Bradshaw, General Manager. Selling agents, Theodore Geissmann & Co., Chicago.

National Steel Casting Company, Montpelier. Built in 1896 and first put in operation in that year; two 15-gross-ton acid open-hearth steel furnaces; product, car couplers, knuckles, and a general line of steel castings from 5 to 20,000 pounds; specialty, railroad, mining, and electric castings; annual capacity, 15,000 tons. Fuel, natural gas from the company's wells. G. Max Hoffmann, President, and F. E. W. Scheimann, Treasurer, Fort Wayne; James O'Donnell, Vice President, and T. C. Neal, General Manager and General Sales Manager, Montpelier; D. F. Bash, Secretary, Indianapolis.

Ohio Falls Iron Company, New Albany. Built in 1866; entirely remodeled and enlarged in 1899; again enlarged in 1901-2; 15 single puddling furnaces, 9 scrap furnaces, 6 heating furnaces, 2 squeezers, one 5-ton hammer, and 5 trains of 3-high rolls (one 18 and one 20-inch muck, one 8 and one 10-inch guide, and one 16-inch bar); product, angles, light rails, and bar iron for bridge works, car works, and railroads; specialties, wide flats up to 12 inches and iron square root angles for safe works; annual capacity, 50,000 tons. Fuel, coal. Brand, "Ohio Falls." George M. Clark, President; Henry Green, Vice President and Treasurer; D. J. Workum, Secretary; Edward S. Short, General Manager; James T. Clark, General Sales Manager and Purchasing Agent.

Oliver Chilled Plow Works, South Bend. Crucible steel plant built in 1891 for the production of steel solely for use in the works in the manufacture of plows; eight 4-pot crucible-steel melting furnaces; annual capacity, 100 tons. Fuel, coke. James Oliver, President; George Ford, Secretary; J. D. Oliver, Treasurer and General Manager.

Western Tin Plate and Sheet Company, Greencastle. Built in 1902-3 and first put in operation April 20, 1903; 6 sheet and pair furnaces, 2 annealing furnaces, 5 stands of 32 and one stand of 36-inch hot rolls, and 6 stands of 34-inch cold rolls; product, black plates or sheets for tinning and galvanizing; annual capacity, 18,000 tons. Fuel, coal and producer gas. Also makes tinplates and terne plates. J. E. Carnahan, President, Edward A. Langenbach, Vice President, W. M. Blecker, General Manager, and R. R. Carnahan, Secretary and Treasurer, Canton, Ohio. (Formerly operated by the Juniata Steel and Iron Company; acquired by the Western Tin Plate and Sheet Company in May, 1905.)—See *Tinplate and Terne Plate Works, Part III.*

Whiteley Steel Company, Muncie; contracting and sales department, Klopfer Block, Muncie. This company controls the process, manufacture, and sale of Whiteley's "Crown" steel, which is manufactured at Muncie; the works at Muncie were built in 1891-3 and "Crown" castings were first made in 1893; one 5-gross-ton furnace; product, Whiteley's "Crown" steel castings for automobiles, pneumatic tools, gas engines, and all purposes where dense, tough, and stiff steel castings are required; annual capacity, 3,000 tons. Fuel, bituminous coal. William G. Wagner, President; Burt H. Whiteley, Vice President and Manager; Amos Whiteley, Treasurer; Elmer J. Whiteley, Secretary.

PROJECTED ROLLING MILLS.

Ward-Dickey Steel Company, Indiana Harbor. Works for the manufacture of hammered planished sheet steel built in 1903-4 and first put in operation April 15, 1904; 6 reverberatory heating furnaces and one hammer; product, hammered finished planished sheet steel from No. 18 to No. 28 gauge made from purchased sheets; annual capacity, from 1,200 to 1,500 tons. Fuel, producer gas. Brand, "Dickey Planished Steel." Contemplates adding more hammers and erecting hot trains of rolls. J. N. Ward, President; W. C. Dickey, Secretary and Treasurer.

Number of rolling mills and steel works in Indiana: 26 completed, one building, and one projected. Of these 6 can make open-hearth steel, one open-hearth steel plant is being built, one plant makes crucible steel, and one plant makes special steel.

ILLINOIS.

COKE FURNACES—24 COMPLETED AND 2 BUILDING.

Federal Furnaces A and B, Federal Furnace Company, Commercial National Bank Building, Chicago. One completed stack and one stack building at 108th st. and Calumet river, South Chicago. Completed stack, A, 75 x 18½; construction commenced October 2, 1905; completed and blown in February 1, 1907; four 2-pass central-combustion chamber stoves, each 75 x 20. Building stack, B, 80 x 20; construction commenced February 11, 1907; four Kennedy stoves, each 80 x 20. Fuel, coke; ore, Lake Superior; product, malleable Bessemer and foundry pig iron; annual capacity of the completed furnace, from 100,000 tons to 125,000 tons; of the building furnace, 125,000 tons: total, from 225,000 tons to 250,000 tons. Brand, "Federal." W. L. Brown, President; C. P. Wheeler, Vice President; A. F. Maynard, Secretary and Treasurer; Harry Kennedy, Superintendent. Selling agents, Pickands, Brown & Co., Chicago.—*Furnace A active in 1907.*

Iroquois Iron Company, South Chicago. Furnaces at 95th st. and Calumet river. Two stacks: Furnace A, 76 x 17½, built in 1890-1 and blown in September 21, 1891; four Kennedy central-combustion chamber stoves, each 85 x 18. Furnace B, 85 x 18½, built in 1900-1 and blown in January 27, 1902; four Kennedy central-combustion chamber stoves, each 93½ x 18. Fuel, coke; ore, Lake Superior, partly mined by the company; product, foundry and malleable pig iron; total annual capacity, 175,000 tons. Brands, "Iroquois" for strong iron, "Sterling Scotch" for soft iron, "Peerless" for high-silicon soft iron, and "Malleable" for iron suitable for malleable work. M. Cochrane Armour, President, Monadnock Block, Chicago; William A. Rogers, Vice President, Buffalo, N. Y.; George A. Tripp, Secretary and Treasurer, and Samuel A. Kennedy, General Manager, South Chicago. Selling agents, Rogers, Brown & Co., Chicago and branch houses.—*Both active in 1907.*

Joliet Works, The Illinois Steel Company, Chicago. Furnaces at Joliet. Four stacks; fuel, coke.—*See page 25.*

North Works, The Illinois Steel Company, Chicago. Furnaces on the west bank of the North Branch of the Chicago river, north of North ave. Two stacks; fuel, coke.—*See page 25.*

South Chicago Furnaces, Wisconsin Steel Company, Chicago. Furnaces at South Chicago. Two completed stacks and one stack building; fuel, coke.—*See pages 210-11.*

South Works, The Illinois Steel Company, Chicago. Furnaces at South Chicago. Eleven stacks; fuel, coke.—*See pages 25-26.*

Union Works, The Illinois Steel Company, Chicago. Furnaces at Ashland ave. and Thirty-first st., on the South Branch of the Chicago river. Two stacks; fuel, coke.—*See page 26.*

Number of coke furnaces in Illinois: 24 completed and 2 building. There are no charcoal stacks in this State.

ROLLING MILLS AND STEEL WORKS—35 COMPLETED AND 3 BUILDING.

Bradley (David) Manufacturing Company, Bradley; branch offices, 63 North Desplaines st., Chicago; Fond du Lac, Wisconsin; Des Moines and Council Bluffs, Iowa; Columbus, Ohio; Minneapolis, Minnesota; Kansas City, Missouri; and Winnipeg, Manitoba, Canada. Works originally built in 1836; crucible steel department added in 1906 and first crucible steel made August 1, 1906; 3 steel-melting furnaces with 6 pots; product, plowshares; annual capacity, 130 tons. Fuel, coke. Also equipped with one 5-gross-ton acid open-hearth steel furnace for melting stock for malleable castings. Company also operates a machine shop.

J. Harley Bradley, President and General Manager, Chicago; B. C. Bradley, Vice President, G. C. Morgan, Jr., Secretary and Purchasing Agent, and F. M. Forrey, Treasurer, Bradley.

Calumet Steel Company, Commercial National Bank Building, Chicago. Building works at Chicago Heights; construction commenced May 14, 1907; being equipped with one continuous coal-fired heating furnace and two 14-inch trains of rolls; product, Bessemer steel bars, angles, channels, tees, cultivator bars, and light rails from 8 lbs. to 20 lbs. per yard; approximate annual capacity, 50,000 tons. Fuel, coal. J. H. Porter, President; A. S. Hook, Vice President and Treasurer; S. S. Porter, Secretary. —*Will probably be ready for operation early in 1908.*

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, N. J. Works at Chicago Heights, Ill.—*Page 123.*

Chicago Heights Works, Inland Steel Company, Chicago. Works at Chicago Heights.—*See page 207.*

Chicago Steel Foundry Company, Rookery Building, Chicago. Works at Nineteenth and Rockwell sts., Chicago. Built in 1907; six 6-pot crucible steel-melting furnaces; 12 pots can be used at a heat; first steel made April 10, 1907; product, high-manganese and high-carbon steel castings; also magnetic steel castings for electrical purposes; annual capacity, 1,200 tons. Fuel, oil. David Evans, President and Treasurer, Rookery Building; David MacLain, Vice President, Milwaukee, Wisconsin; Irvin McDowell, Secretary, 4630 Gross ave., Chicago. Sole selling agents, David Evans & Co., Rookery Building, Chicago.

Columbia Tool Steel Company, Chicago Heights. Built in 1904-5; 2 Siemens-Martin 30-pot crucible steel-melting furnaces with an annual capacity of 5,400 tons of ingots, 4 Swindell gas producers, 6 coal-fired heating furnaces, 4 steam hammers, (750-lb., 1,400-lb., 3,500-lb., and 6,000-lb.,) and 2 trains of rolls (one 14-inch with one 2-high and three 3-high stands and one 9-inch with four 3-high and two 2-high stands); first crucible steel made May 9, 1905; first products rolled May 15, 1905; product, rolled and hammered tool steel and crucible machinery steel; annual capacity, 4,000 tons. Fuel, bituminous coal and manufactured gas. E. T. Clarage, President; Frank Matthiessen, Vice President; Alexander B. Peterson, Secretary; M. H. Kilgallen, Treasurer.

Commonwealth Steel Company, Bank of Commerce Building, St. Louis. Works at Granite City. Built in 1902; four 20-gross-ton basic open-hearth steel furnaces; first steel made September 8, 1902; product, steel castings exclusively, including locomotive driving wheel centres; annual capacity, 50,000 tons. Fuel, oil. Clarence H. Howard, President; Thomas K. Niedringhaus and H.

- M. Pflager, Vice Presidents ; George K. Hoblitzelle, Vice President and Treasurer ; George E. Howard, Vice President and Sales Manager ; F. L. Morey, Secretary.
- Crane Company, Chicago. Manufacture of valves and fittings established in 1855 ; steel foundry added in 1906-7 ; one 1½-gross-ton Zenzes converter and one cupola ; first steel made January 2, 1907 ; product, soft steel suitable for the manufacture of valves and fittings ; annual capacity, 5,000 tons. Also makes brass, gray iron, ferro-steel, and malleable iron castings. R. T. Crane, President ; Charles R. Crane, First Vice President ; R. T. Crane, Jr., Second Vice President ; A. F. Bennett, Secretary ; A. D. MacGill, Treasurer ; H. C. Fuller, Auditor ; C. H. Penny, Purchasing Agent.
- Deering Works Rolling Mill, Wisconsin Steel Company, Chicago. (Formerly called the Deering Mills and operated by the International Harvester Company.)—*See page 211.*
- Dillon-Griswold Wire Company, Sterling. Rod mill added to wire and wire-nail plant in 1899-1900 and first put in operation in January, 1900 ; 2 forge fires, one double heating furnace, 3 trains of rolls, (one 9, one 14, and one 16-inch,) 125 wire-drawing blocks, 30 wire-nail machines, and 6 automatic single-loop hay bale-tie machines ; product, wire rods, plain and galvanized wire, wire nails, barb wire, hay bale-ties, and "Griswold Square" and "Sterling Diamond" mesh field fence ; annual capacity, 50,000 tons of rods, 22,000 tons of wire, and 200,000 kegs of wire nails. Steam and water power. Fuel, bituminous coal. A galvanizing plant is connected with the works. Chester Griswold, President and Treasurer, 43-49 Exchange Place, New York ; John B. Howat, Vice President and General Manager, and Robert McCosh, Secretary and Purchasing Agent, Sterling.—*Rod mill idle.*
- East St. Louis Works, American Steel Foundries, Chicago. Works at East St. Louis, Illinois.—*See page 126.*
- Grand Crossing Tack Company, Grand Crossing ; sales offices, Grand Crossing, Chicago, and San Francisco. Two works, one (wire-rod mill) at Grand Crossing and one (open-hearth steel plant) at 118th st. and Calumet river, Chicago. Grand Crossing Works : wire-rod mill added to a wire and wire-nail plant in 1899-1900 and first put in operation February 1, 1900 ; one Morgan continuous heating furnace, one continuous wire-rod train with 14 supplemental trains, 70 wire-drawing blocks, 73 wire-nail machines, and 30 cut-nail machines ; product, wire rods, wire, wire nails, staples, barbed wire, field fencing, rivets, tacks, and iron and steel cut nails ; annual capacity, 45,000 tons of wire rods, 30,000 tons of wire, 300,000 kegs of wire nails, 3,000 tons of rivets, 1,500 tons of tacks, 500 tons of staples, and 30,000 kegs of cut nails ; fuel, bitu-

- minous coal; brand, "Grand Crossing Tack Company." Chicago Works: built in 1902-3; two 40-gross-ton Wellman stationary basic open-hearth steel furnaces with an annual capacity of 50,000 tons; first steel made in July, 1903; two 4-hole soaking pits and one 35-inch blooming and billet mill; product, 1½-inch square billets for the use of the company; annual capacity, 45,000 tons; fuel, manufactured gas. O. N. Hutchinson, President, Treasurer, and Manager; E. W. Hutchinson, Secretary and Superintendent.
- Granite City Steel Works Branch, National Enameling and Stamping Company, New York. Works at Granite City, Ill. (Formerly called the Granite City Rolling Mills.)—*See page 218.*
- Granite City Works, American Steel Foundries, Chicago. Works at Granite City.—*See page 126.*
- Hartmann, Hay & Reis, Belleville. Built in 1885-6; 2 gas heating furnaces, one coal heating furnace, one 22-inch train of rolls, and 96 cut-nail machines; product, iron and steel cut nails and tack and shovel plate; annual capacity, 5,000 tons of rolled material and 175,000 kegs of cut nails. Fuel, manufactured gas. A galvanizing department is connected with the works; product, galvanized cut nails. E. E. Wangelin, Manager.
- Joliet Iron Products Company, Joliet. Construction commenced in June, 1907; being equipped with 4 double puddling furnaces, one billet heating furnace, 2 reverberatory heating furnaces, one squeezer, 2 trains of rolls, (one 22-inch muck, billet, and bar and one 12-inch bar and guide,) one crane, and 3 shears; product, round and square bar iron, flats, angles, and shapes; annual capacity, 25,000 tons. Fuel, bituminous coal. J. J. Gaskill, President, C. E. Woodruff, Secretary, Treasurer, and General Manager, and D. H. Lentz, General Superintendent, Joliet; Gus. Aucutt, Vice President, Aurora, Ill.
- Joliet Plant, (owned,) American McKenna Process Company, Milwaukee, Wis. Works at Joliet, Ill.—*See page 123.*
- Joliet Works, Phoenix Horse Shoe Company, Chicago Works at Joliet.—*See page 117.*
- Joliet Works, The Illinois Steel Company, Chicago. Works at Joliet.—*See pages 26-27.*
- Link-Belt Works, Link-Belt Company, Chicago; branch offices, Philadelphia (Nicetown) and Indianapolis. Works at Thirty-ninth st. and Stewart ave. Original works built in 1883; one 2,500-lb. Zenzes steel converter, served with 2 cupolas, added in 1907 and first steel made July 20, 1907; product, steel castings for the use of the company exclusively; estimated annual capacity, from 800 tons to 1,000 tons. Also manufacture iron and steel chains for conveying, elevating, and power transmission. James M. Dodge, Chair-

- man, Nicetown, Philadelphia; Charles Piez, President, Staunton B. Peck, Second Vice President, S. Howard-Smith, Treasurer, and L. W. Shirley, Sales Manager, Chicago; Glenn G. Howe, First Vice President, Indianapolis.
- Madison Plant, Helmbacher Forge and Rolling Mills Company, St. Louis, Mo. Works at Madison, Ill.—*See page 219.*
- Melrose Park Works, Latrobe Steel and Coupler Company; main offices, 1200 Girard Building, Philadelphia; Chicago offices, 1720 Old Colony Building. Works at Melrose Park, Illinois. Open-hearth steel department built in 1884-5 and first steel made in February, 1885; plant now contains two 30-gross-ton basic furnaces; product, steel castings and automatic steel car couplers; annual capacity, 35,000 tons. Brands, "Latrobe," "Chicago," "Melrose," and "Munton." Fuel, coal and manufactured gas. Marriott C. Smyth, President; C. C. Warren, Secretary; John Henderson, Treasurer; W. L. Jacoby, General Manager.
- Missouri Malleable Iron Company, East St. Louis. Built in 1892; open-hearth steel furnace added in 1900; 2 cupolas, 14 gas producers, 23 annealing furnaces, 6 air furnaces, and one 25-gross-ton basic open-hearth steel furnace; product, malleable iron castings; steel castings could be made; annual capacity, 25,000 tons. Fuel, coal. F. E. Nulsen, President and General Manager; A. J. Nulsen, Vice President; H. L. Berkemeyer, Treasurer; H. L. Baur, Secretary.
- Otis Elevator Company, 17 Battery Place, New York; Chicago offices, 9 Jackson Boulevard; Philadelphia offices, 12th and Sansom sts.; Pittsburgh offices, 1016 Penn ave. Works at 550 West 15th st., Chicago. Steel department built in 1905 and first steel made in August, 1905; one 3-gross-ton Schwartz furnace and one cupola; product, steel castings; annual capacity, 500 tons. Fuel, oil. W. D. Baldwin, President; A. G. Mills and C. G. Comstock, Vice Presidents; A. S. Barb, Secretary; L. Belknap, Treasurer.
- Pioneer Steel Company, Rockford. Built in 1907; 4 furnaces for the manufacture from purchased steel of soft-centre carbonized steel by the Clark process; first steel made in April, 1907; annual capacity, 4,000 tons. Fuel, coke and coal. J. B. Whitehead, President; J. W. Kelchner, Vice President; N. F. Thompson, Secretary and Treasurer.
- Pullman (The) Company, Pullman; Chicago offices, Pullman Building. Built in 1883-4; 2 forge fires, 3 gas heating furnaces, 4 coal heating furnaces, and 3 trains of rolls (8-inch, 10-inch, and 18-inch); product, muck bar, car and merchant iron and steel, and special shapes; annual capacity, 60,000 tons of bar iron and 15,000 tons of muck bar. Fuel, coal and manufactured gas. A gray

iron foundry with an annual capacity of 20,000 tons is connected with the works. Robert T. Lincoln, President, J. S. Runnells, Vice President, Richmond Dean, General Manager, and H. P. Walden, Purchasing Agent, Chicago.

Robey Street Works, American Rolling Mill Corporation, Great Northern Building, Chicago. Works at Robey st. and the South Branch of the Chicago river; construction commenced in November, 1906, and suspended in 1907. D. M. Cohen, Trustee.—*See Muncie Works in Indiana, page 380.*

St. Louis Steam Forge and Iron Works, East St. Louis. Built in 1902-3, utilizing in part the machinery from the dismantled plant of the company at St. Louis, Mo.; first products rolled June 22, 1903; 9 reverberatory heating furnaces, 3 forge fires, 2 trains of rolls, (one 18-inch muck and one 10-inch guide,) and 5 upright hammers (one 7,000-lb., three 4,000-lb., and one 1,500-lb.); product, bar iron, car axles, forgings, and bolts and nuts; annual capacity, 20,000 tons of finished rolled products and 8,000 tons of forged products. Fuel, bituminous coal. G. C. McDonald, President; Annabelle McD.-Heckel, Vice President; C. L. McDonald, Secretary, Treasurer, and Manager.

Sellers Manufacturing Company, Chicago; sales offices, 613 Western Union Building, Chicago. Two works: Chicago Avenue Works, at Chicago ave. and the Chicago river; built in 1878; 2 forge fires, three 4-door heating furnaces, and one 16-inch train of rolls; product, iron splice bars and tie plates, including "Sansom" bars; annual capacity, 22,500 tons; fuel, bituminous coal. Mayfair Works, at Mayfair, Chicago; construction commenced March 1, 1907; completed and put in operation August 14, 1907; 2 forge fires, one 6-door heating furnace, and one 21-inch train of rolls; product, splice bars, including "Sansom" bars, and tie plates; annual capacity, 22,500 tons; fuel, coal; one 6-door heating furnace will be added to the Mayfair Works and the annual capacity of the plant will be increased to 45,000 tons; a punching and shearing department will be connected with the works. Morris Sellers, President; J. M. Sellers, Vice President and General Manager; T. F. Geraghty, Secretary; Gustav Hessler, Jr., Treasurer. (The Chicago Avenue Works were formerly known as the Chicago Splice Bar Mill.)

South Works, The Illinois Steel Company, Chicago. Works at South Chicago.—*See pages 27-28.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Mass.; sales offices, Fitchburg, Mass.; 85 First st., Portland, Oregon; 119 Jackson st., Seattle, Washington; 40 Murray st., New York. Works at Western ave., Sixteenth and Seventeenth sts.,

Chicago. Built in 1900 and first put in operation in December, 1900; 4 heating furnaces and 2 trains of rolls (one 18-inch and one 24-inch); 2 crucible steel-melting furnaces (one 30-pot with 5 holes and one 36-pot with 6 holes); first crucible steel made December 17, 1900; annual capacity, 5,500 tons of ingots; product, saw plate and crucible sheet steel; annual capacity, 2,000 tons of rolled products. Fuel, coal and coke. Daniel Simonds, President, and G. K. Simonds, Treasurer, Fitchburg, Mass.

Steel Mill, Wisconsin Steel Company, Chicago. Works at South Chicago. (Formerly called the South Chicago Works and operated by the International Harvester Company.)—*See page 211.*

Sylvan Works, Republic Iron and Steel Company, Pittsburgh. Works at Moline, Ill.—*See page 96.*

Tudor Works, Republic Iron and Steel Company, Pittsburgh, Pa. Works at East St. Louis, Ill.—*See page 96.*

Waukegan Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Waukegan, Ill.—*See page 46.*

Western Tube Company, Kewanee. Built in 1883 and put in operation in November, 1883; 8 double busheling furnaces, one squeezer, 12 heating furnaces, 4 trains of rolls, (one 18-inch muck and 3 finishing,) and one 5,000-lb. hammer; product, skelp, used by the company in the manufacture of wrought iron and steel pipe; annual capacity, 75,000 tons of skelp. Fuel, coal and manufactured gas. The wrought iron and steel pipe plant makes butt-welded pipe from $\frac{1}{4}$ of an inch to 3 inches inclusive; annual capacity, 25,000 tons of wrought iron and 60,000 tons of wrought steel pipe. William B. Schiller, President; Edward Worcester, Vice President; John D. Culbertson, Secretary and Treasurer.

Number of rolling mills and steel works in Illinois: 35 completed and 3 building. Of these 3 make standard Bessemer steel, one makes Tropenas steel, 2 make Zenzes steel, one makes Schwartz steel; 8 can make open-hearth steel, 5 make crucible steel, and one makes soft-centre carbonized steel by the Clark process.

MICHIGAN.

COKE FURNACES—2.

Detroit Furnace Company, Detroit. One stack, 62 x 12 $\frac{1}{2}$, built in 1870; changed from bituminous coal to charcoal in 1879; abandoned for several years; rebuilt in 1902-3 and again blown in in 1903 with charcoal for fuel; remodeled in 1906 and fuel changed to coke in that year; first coke pig iron made August 22, 1906; three iron stoves; ore, Lake Superior; product, foundry, malle-

able Bessemer, basic and car-wheel pig iron; annual capacity, 30,000 tons. Brand, "Detroit." J. C. Clutts, President, Wellston, Ohio; J. K. Pollock, Vice President, Cincinnati; C. F. Fraser, Secretary and Treasurer, and P. McMillen, General Manager, Detroit. Selling agents, Rogers, Brown & Co., Cincinnati and branch houses. (Formerly called Wayne Furnace and operated as a charcoal furnace by the Wayne Iron Company, Limited; acquired by the present company on April 17, 1906.)—*Active in 1907.*

Detroit Iron and Steel Company, Detroit. Works on Zug Island, River Rouge, Wayne county. One stack, 78 x 17½, built in 1903 and first put in operation February 15, 1904; four 2-pass stoves, each 83 x 20; fuel, by-product coke made by the Semet-Solvay process; ore, Lake Superior; product, foundry and malleable pig iron; annual capacity, from 90,000 tons to 100,000 tons. Brand, "Zug." D. R. Hanna, President, F. B. Richards, Vice President, and M. McMurray, General Manager, 617 Perry-Payne Building, Cleveland; Charles W. Baird, Secretary and Treasurer, 149 Jefferson ave., Detroit. Sole sales agents, M. A. Hanna & Co., Cleveland.—*Active in 1907.*

Number of coke furnaces in Michigan: 2 stacks.

CHARCOAL FURNACES—11 COMPLETED AND 1 BUILDING.

Antrim Iron Company, Mancelona; general offices, Michigan Trust Building, Grand Rapids. One stack, 60 x 12, built in 1887-8, blown in in February, 1888, and rebuilt in 1895 and 1903; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 40,000 tons. Brand, "Antrim." Connected with the furnace are 76 charcoal kilns with an annual capacity of 3,250,000 bushels. W. Barnhart, President, J. C. Holt, Vice President and Treasurer, and H. J. Bennett, Secretary, Grand Rapids; N. M. Langdon, Manager, Mancelona.—*Active in 1907.*

Boyne City Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Boyne City. One stack; fuel, charcoal. (Formerly called Pine Lake Furnace and operated by the Boyne City Charcoal Iron Company.)—*See page 215.*

Cadillac Furnace, Mitchell-Diggins Iron Company, Cadillac. One stack, 60 x 12; construction commenced May 3, 1905; completed and blown in March 6, 1906; three fire-brick stoves; ore, Lake Superior from the Marquette and Menominee Ranges; product, malleable, car-wheel, and strong foundry pig iron sold by analysis; annual capacity, 40,000 tons. Brand, "Cadillac." Joseph C. Ford, President; William W. Mitchell, Vice President; Edward Fitzgerald, Secretary. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1907.*

Carp Furnace, Pioneer Iron Company, Negaunee; Cleveland offices, Rockefeller Building. Furnace at Marquette. One stack; fuel, charcoal.—*See page 213.*

Chocolay Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Chocolay. One stack; fuel, charcoal. (Formerly called Chocolay Furnace and owned but never operated by the Northern Charcoal Iron Company.)—*See pages 215-16.*

East Jordan Iron Company, East Jordan. Building: one stack, to be 60 x 10; construction commenced September 1, 1907, using part of the machinery and equipment formerly in the Principio Furnace, at Principio, Md.; two fire-brick stoves, each 60 x 15; ores, Lake Superior from the Marquette, Menominee, and Mesabi ranges; product, car-wheel and malleable pig iron; estimated annual capacity, 24,000 tons. C. H. Schaffer, President, Marquette; Frank B. Baird, Vice President, Buffalo; W. J. Ellson, Secretary and Treasurer, and F. D. Tower, General Manager, East Jordan.—*Will probably be ready for operation in 1908.*

Elk Rapids Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Elk Rapids. One stack; fuel, charcoal. (Formerly called Elk Rapids Furnace and operated by the Elk Rapids Iron Company.)—*See page 216.*

Fruitport Furnace, The Spring Lake Iron Company, Fruitport. One stack, 56 x 11, built in 1879-80 and remodeled in 1891; hot blast; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 29,000 tons. Brand, "Spring Lake." J. C. Ford, President and Treasurer. Sales made by the company.—*Active in 1907.*

Manistique Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Manistique. One stack; fuel, charcoal. (Formerly operated by the Manistique Iron Company.)—*See page 216.*

Newberry Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Newberry. One stack; fuel, charcoal. (Formerly operated by the Michigan Iron Company, Limited.)—*See page 216.*

Pioneer Furnace, The Cleveland-Cliffs Iron Company, Ishpeming; Cleveland offices, Rockefeller Building. Furnace at Gladstone. One stack; fuel, charcoal.—*See page 214.*

Pioneer Furnace No. 2, Pioneer Iron Company, Negaunee; Cleveland offices, Rockefeller Building. Furnace at Marquette. One stack; fuel, charcoal.—*See page 213.*

Number of charcoal furnaces in Michigan: 11 completed and one building.

Total number of furnaces in Michigan: 13 completed and one building. Of these 2 stacks use coke, 11 stacks use charcoal, and one charcoal stack is being built.

ROLLING MILLS AND STEEL WORKS—13 COMPLETED AND
1 BUILDING.

- Adrian Steel Casting Company, Adrian. Built in 1905; 6 crucible steel-melting furnaces; 24 pots can be used at a heat; first steel made July 20, 1905; product, steel castings; annual capacity, 500 tons. Fuel, oil. G. B. M. Seager, President; Amos M. Kells, General Manager; O. L. Palmer, Secretary; E. N. Smith, Treasurer.
- Carroll (The) Foundry, Houghton. Original works built in 1893; one 3-gross-ton modified Tropenas steel converter and one cupola added in 1906-7; first steel made February 25, 1907; product, castings; annual capacity, 5,000 tons. A crucible steel department may be added. Fuel, oil. M. J. Carroll, Purchasing Agent.
- Detroit Seamless Steel Tubes Company, 804 Union Trust Building, Detroit. Works at 841 Jefferson ave. West. Built in 1900 and first put in operation January 1, 1901; 3 heating furnaces, 2 annealing furnaces, one piercing machine, and 3 trains of rolls; product, rolled blanks, all consumed by the company in the manufacture of cold-drawn seamless open-hearth steel marine, locomotive, and other boiler tubes, automobile tubes, arch pipes, stay tubes, safe ends, mechanical tubes, and upset and swelled tubes; annual capacity, 12,000 tons of blanks and 8,000 tons of tubes 3½ inches in diameter and smaller. Fuel, bituminous coal. Brand, "Detroit." P. H. McMillan, President; T. H. Simpson, Vice President; George M. Black, Treasurer; R. H. Phillips, Secretary. (Formerly operated by the Seamless Steel Tubes Company; name changed to the Detroit Seamless Steel Tubes Company on August 22, 1904.)
- Detroit (The) Steel Casting Company, Detroit, Mich. Built in 1889; destroyed by fire February 19, 1905; rebuilt and put in operation September 30, 1905; now equipped with two 1½-gross-ton Robert-Bessemer steel converters and one cupola; first blow made July 11, 1889; two 20-gross-ton stationary basic open-hearth steel furnaces, 2 gas producers, and 2 annealing furnaces; first open-hearth steel made October 23, 1905; product, steel castings; annual capacity, 5,000 tons of Robert-Bessemer and 15,000 tons of open-hearth steel castings. Fuel, coke and oil. John S. Newberry, President and General Manager; Allen W. Atterbury, Vice President and Treasurer; Thomas F. Meek, Secretary.
- Detroit Works, Steel Department, Railway Steel-Spring Company, New York. Works at Detroit.—*See page 179.*
- Harrow Spring Company, Kalamazoo. Built in 1900-1 and first put in operation January 30, 1901; 3 reverberatory heating furnaces and 2 trains of rolls (one 9 and one 16-inch); product, merchant steel; specialties, spring and special steel; also mild steel merchant bars; annual capacity, 16,000 tons. Fuel, bituminous coal. A

plant for the manufacture of springs for railway cars, street cars, car fenders, track scrapers, agricultural implements, etc., is connected with the works; another for the manufacture of harrow teeth, hay-rake teeth, etc. C. A. Dewing, President; E. R. Burdick, Secretary; W. P. Burdick, Treasurer and General Manager. Industrial Works, Bay City. Originally built in 1873 to manufacture special railway machinery; construction of one 10-gross-ton Siemens basic open-hearth stationary furnace commenced May 10, 1907; product, to be steel castings for the use of the works in the manufacture of railroad wrecking cranes, pile drivers, steam and electric locomotive cranes, transfer tables, and other similar appliances; estimated annual capacity, 9,000 tons. Fuel, crude oil. William L. Clements, President; Charles R. Wells, Secretary and Treasurer; E. B. Perry, General Manager.

Michigan Crucible Steel Castings Company, 248-250 Guoin st., Detroit. Built in 1907; five 4-pot crucible steel-melting furnaces; total number of pots, 20; number of pots that can be used at a heat, 12; first steel made May 15, 1907; product, all kinds of light crucible steel castings; specialty, automobile castings; annual capacity, 1,000 tons. Fuel, oil and coke. R. F. Flintermann, President, and Hobart B. Hoyt, Secretary and Treasurer, Detroit; W. J. Garrod, Vice President, Chicago.

Michigan-Peninsular Works, American Car and Foundry Company, St. Louis. Works at Detroit.—*See pages 220-21.*

Monarch Steel Castings Company, Detroit. Built in 1906 and first put in operation July 20, 1906; one 20-gross-ton acid open-hearth steel furnace; product, Monarch, solid, and Detroit couplers and coupler attachments; annual capacity, 6,000 tons. Fuel, oil. Philip H. McMillan, President; T. H. Simpson, Vice President and Manager; George M. Black, Secretary and Treasurer.

New Process Steel Company, Marshall. Built in 1906; construction commenced August 6, 1906, and first steel castings made September 28, 1906; six 4-pot crucible steel-melting furnaces; 24 pots can be used at a heat; product, crucible steel castings from 1 lb. and less up to 250 lbs.; also nickel-vanadium steel castings; annual capacity, 600 tons. Fuel, oil. S. F. Dobbins, President; F. A. Stuart, Vice President; S. C. French, Secretary and Manager; F. S. Deuel, Treasurer.

Prescott (The) Company, Menominee; branch offices, Portland, San Francisco, and Chicago. Original works built in 1899-1900; one 5-gross-ton Wellman-Seaver-Morgan basic open-hearth steel furnace added in 1907 and first steel made June 10, 1907; product, electrical, saw mill, and general castings; annual capacity, 5,000 tons. An additional 10-gross-ton basic open-hearth fur-

nace may be installed. Fuel, coal and oil. The works are also equipped with 6 hammers, 2 cupolas, and one bronze and brass furnace; product, forgings and gray iron, brass, and bronze castings; annual capacity, 500 tons of forgings, 6,000 tons of gray iron castings, 50 tons of bronze castings, and 100 tons of brass castings. A large machine shop is also connected with the works. D. Clint Prescott, President; Edward L. Prescott, Vice President; Loren L. Prescott, Secretary and Manager; Sumner K. Prescott, Treasurer. Reed Manufacturing Company, Kalamazoo. Built in 1907; five 4-pot downdraft crucible steel-melting furnaces; 20 pots can be used at a heat; first steel made June 4, 1907; product, steel castings for general machinery, automobiles, engines, etc.; specialty, automobile castings; annual capacity, 800 tons. Fuel, oil. Joseph E. Brown, President, J. E. Welborn, Secretary and General Manager, and B. W. Raseman, Treasurer, Kalamazoo; E. E. Reed, Vice President, Oakfield, New York.

Western Malleable Steel Company, Detroit. Built in 1905; one cupola, 4 annealing furnaces, and one special steel furnace; product, gray iron and malleable steel castings; specialty, malleable steel castings for pneumatic tools, automobiles, gas engines, and all purposes where castings of a homogeneous and tough nature are required; first malleable steel castings made December 5, 1905; annual capacity, 1,200 tons of gray iron and 1,500 tons of malleable steel castings. Fuel, coal and Solvay coke. Also makes forgings. N. M. Kaufman, President; C. E. Gordon, Vice President and General Manager; S. R. Kaufman, Secretary and Treasurer. Number of rolling mills and steel works in Michigan: 13 completed and one building. Of these one makes Robert-Bessemer steel and one makes steel in a modified Tropenas converter; 3 make open-hearth steel and one open-hearth steel plant is being built; 4 make crucible steel and one existing Tropenas steel plant may install crucible steel-melting furnaces; and one makes special steel.

WISCONSIN.

COKE FURNACES—6 COMPLETED AND 1 BUILDING.

Mayville Furnaces, The Northwestern Iron Company, Colby-Abbot Building, Milwaukee. Two stacks at Mayville, each 77 x 17: Furnace A, built in 1848 as a charcoal furnace, rebuilt in 1872 and 1884, and remodeled and enlarged in 1887 to use coke; again remodeled and enlarged in 1896; new shell built in 1903; three Cowper-Foote stoves, each 60 x 18. Furnace B, built in 1905-7; construction commenced October 1, 1905; first blown in May 2, 1907; four Julian Kennedy stoves, each 77 x 20. Fuel, coke, obtained

chiefly from Milwaukee; ores, Lake Superior and local from near Iron Ridge, partly mined by the company; product, Bessemer, malleable Bessemer, and foundry pig iron; annual capacity: Furnace A, 75,000 tons; Furnace B, 90,000 tons: total, 165,000 tons. Brands, "Sydney" and "Gertrude." Ferdinand Schlesinger, President, Edgar N. Dickson and Henry J. Schlesinger, Vice Presidents, Armin A. Schlesinger, Treasurer, and Jerome Havlish, Secretary, Milwaukee; William K. Packman, General Manager, Mayville. Selling agents, Pickands, Brown & Co., Milwaukee and Chicago.—*Both active in 1907.*

Milwaukee Works, Bay View Furnaces, The Illinois Steel Company, Chicago. Two coke furnaces at Milwaukee.—*See page 25.*

Spring Valley Furnace, Spring Valley Iron and Ore Company, 1135 Monadnock Building, Chicago. Furnace at Spring Valley. One stack, 66 x 13½, built in 1892-3 to use charcoal for fuel; equipped with machinery from the Fannie Furnaces, at Shawnee, Ohio; first blown in February 20, 1894; fuel changed from charcoal to coke in 1899, but occasionally charcoal is used; three 2-pass Siemens hot-blast stoves, each 63 x 17; ore, brown hematite chiefly mined by the company; product, malleable Bessemer and foundry pig iron; annual capacity, 35,000 tons. Brand, "Spring Valley." Connected with the furnace are 46 charcoal kilns with an annual capacity of 1,800,000 bushels. Frederick H. Foote, President and Treasurer, Chicago; George C. Foote, Vice President, Port Henry, New York; Wallace P. Foote, Secretary, and H. B. Feidler, Superintendent, Spring Valley. Selling agents, Pickands, Brown & Co., Rookery Building, Chicago.—*Active in 1907.*

Thomas Furnaces, The Thomas Furnace Company, Milwaukee. One completed stack and one stack building. The completed stack, 75 x 16, was built in 1873 and blown in in the spring of that year; rebuilt in 1892 and in 1901; two Hugh Kennedy hot-blast stoves, each 60 x 18, and two Massicks & Crooke stoves, 75 x 18. Building stack, to be 80 x 18½; construction commenced June 3, 1907; new furnace will use stoves of old furnace, which will be dismantled. Fuel, coke; ore, Lake Superior partly mined by the company; product, foundry, malleable Bessemer, and standard Bessemer pig iron; specialty, malleable Bessemer pig iron; annual capacity, 90,000 tons. Brand, "Thomas." John M. Thomas, President and Manager, Milwaukee; W. Aubrey Thomas, Vice President, and T. E. Thomas, Treasurer, Niles, Ohio. Sales made by the company.—*Old furnace, active in 1907, being dismantled.*

Number of furnaces in Wisconsin: 6 completed and one building. Of these 5 use coke alone, one coke stack is being built, and one stack uses coke principally but occasionally charcoal alone.

CHARCOAL FURNACES—1.

Ashland Plant, Lake Superior Iron and Chemical Company, Detroit. Furnace at Ashland. One stack; fuel charcoal. (Formerly called Hinkle Furnace and operated by the Ashland Iron and Steel Company.)—*See page 215.*

Number of charcoal furnaces in Wisconsin: one stack.

Total number of furnaces in Wisconsin: 7 completed and one building. Of these 5 stacks use coke alone, one coke stack is being built, one stack uses coke principally but occasionally charcoal alone, and one stack uses charcoal. No bituminous coal furnaces.

ROLLING MILLS AND STEEL WORKS—16.

Bay View (The) Steel Casting Company, Milwaukee. Built in 1894; 6 crucible steel-melting furnaces with 3 chambers each; 18 holes can be used at a heat; first crucible steel made November 27, 1894; product, steel castings; annual capacity, 750 tons. Fuel, oil. M. C. Rice, President; N. T. Moore, Vice President; T. H. Rice, Secretary, Treasurer, and Manager. (One 1-gross-ton acid open-hearth furnace, built in 1897, dismantled in 1905.)

Bucyrus (The) Company, South Milwaukee. Built in 1892; one 10-gross-ton stationary basic open-hearth steel furnace added in 1905-6; first steel made February 27, 1906; 2 gas producers, 2 annealing furnaces, and 2 cupolas; product, steel castings, used by the company in the manufacture of dredges, steam shovels, railroad wrecking cranes, pile drivers, excavating machinery, etc.; annual capacity, 4,500 tons of steel castings. Fuel, producer gas. Also makes gray iron machinery castings; annual capacity, from 3,600 tons to 4,000 tons. Building an additional 12-gross-ton basic open-hearth steel furnace. Howard P. Eells, President; S. L. G. Knox, Vice President and Chief Engineer; E. K. Swigart, Secretary and Treasurer. New York office, 628 Singer Building.

Crucible Steel Casting Company, 612 Clinton st., Milwaukee. Built in 1898; eight 3-hole crucible steel-melting furnaces; first steel made in December, 1898; 16 pots can be used at a heat; product, machinery castings of all kinds; annual capacity, 1,500 tons. Fuel, oil. F. A. Lange, President and Manager.

Dutcher (The) Company, Milwaukee. Four 4-pot Noble liquid-fuel crucible steel-melting furnaces built in 1889 and first steel made in that year; not now used. Open-hearth department added in 1895 and enlarged in 1906; now contains one 10-gross-ton acid furnace; first open-hearth steel made in 1895. Product, chiefly bicycle, machinery, and electrical castings; annual capacity, 4,000 tons of open-hearth and 75 tons of crucible castings. Fuel, oil.

William Goodrich, President; H. B. Goodrich, Vice President and Treasurer; John H. Hetherington, Secretary. (Formerly operated by the J. A. and P. E. Dutcher Company; acquired by the Dutcher Company on March 1, 1907.)

Eagle Horse Shoe Company, South Milwaukee. Built in 1892 and first put in operation July 1, 1892; destroyed by fire in 1901 and rebuilt in the same year; enlarged in 1905; 6 single busheling furnaces, one double busheling furnace, 3 heating furnaces, 3 trains of rolls, (one 3-high 16-inch and one 9 and one 10-inch finishing,) one squeezer, and 4 horseshoe machines; product, horseshoes, mule shoes, and bar iron; annual capacity, 35,000 tons of bar iron and 100,000 kegs of horseshoes. Fuel, coal. C. H. Rawlins, Agent for the Trustee.

Falk (The) Company, Milwaukee. Built in 1900 and enlarged in 1905; plant now contains 2 Wellman-Seaver acid open-hearth steel furnaces (one 15 and one 18-gross-ton); first steel made April 7, 1900; product, all kinds of open-hearth steel castings; annual capacity, 20,000 tons. Fuel, oil. Herman W. Falk, President; Otto H. Falk, Vice President; E. A. Wurster, Secretary and Treasurer.

Gerlinger Steel Casting Company, West Allis. Built in 1902-6; 4 crucible steel-melting furnaces; number of pots, 16; first crucible steel made January 12, 1903; product, crucible steel castings for automobiles and electric, mining, saw mill, and general machinery purposes; annual capacity, 700 tons. Fuel, oil. W. E. Gerlinger, President; George P. Gerlinger, Vice President; C. A. Gerlinger, Secretary and Treasurer. (Formerly operated by the Tobin-Gerlinger Steel Casting Company; acquired by the Gerlinger Steel Casting Company on April 10, 1905.)

Maynard Steel Foundry Company, 710-16 Reed st., Milwaukee. Built in 1907; five 4-pot crucible steel-melting furnaces; total number of pots, 20; number of pots that can be used at a heat, 10; first steel made March 28, 1907; product, all kinds of small crucible steel castings; annual capacity, 800 tons. Fuel, oil. C. F. Maynard, President and Treasurer; W. T. Maynard, Secretary.

Milwaukee Steel Foundry Company, South Water and Virginia sts., Milwaukee. Built in 1903-4; one 3,000-lb. special steel converter; first steel made March 15, 1904; product, steel castings, electrical steel, tool steel, manganese steel, and machinery steel; specialty, automobile castings; annual capacity, single turn, 2,400 tons. Fuel, Semet-Solvay coke. Adding one 3,000-lb. special converter. J. G. Shaw, President and Manager; F. A. Weiss, Vice President; C. W. Inglis, Secretary and Treasurer.

Milwaukee Works, The Illinois Steel Company, Chicago. Works at Milwaukee.—*See page 27.*

- National Brake and Electric Company, Milwaukee; general sales offices, 519 First National Bank Building, Chicago. Built in 1899-1900; 2 crucible steel-melting furnaces with 4 steel-melting holes; number of crucible pots, 8; first crucible steel made in May, 1900; one 5-gross-ton acid open-hearth steel furnace built in 1904; first open-hearth steel made August 1, 1904; product, steel castings; specialties, crank shafts, magnet frames, pole pieces, and general machinery castings; annual capacity, 3,000 tons of open-hearth and 200 tons of crucible steel castings. Fuel, oil. A plant for the manufacture of air brakes and electrical machinery is connected with the works. Charles L. Sullivan, President, and S. I. Wailes, General Sales Manager, Chicago; R. P. Tell, Vice President and General Manager, W. K. Boyle, Secretary and Auditor, and J. R. Petley, Treasurer and Purchasing Agent, Milwaukee. (Formerly operated by the National Electric Company; acquired by the National Brake and Electric Company on March 26, 1906.)
- Nortmann-Duffke Foundry Company, 26th avenue, Layton Park, Milwaukee. Built in 1902; 5 crucible steel-melting furnaces with 30 holes; total number of pots, 30; first crucible steel made in October, 1902; product, crucible steel castings; annual capacity, 1,300 tons. Fuel, oil. A gray iron foundry with a daily capacity of 15 tons of all kinds of machinery castings is connected with the works; also a plant for the manufacture of pressed-steel tanks and pressed, deep-stamped, and drawn-steel specialties. Val Nortmann, President; Louis Duffke, Secretary, Treasurer, and Manager.
- Oostburg Steel Foundry, Oostburg. Construction commenced April 1, 1907; one 6-pot crucible steel-melting furnace; first steel made October 16, 1907; product, all kinds of crucible steel castings; annual capacity, 600 tons. Fuel, coal. W. H. Sprangers, President and General Sales Manager; Peter Daane, Vice President; John W. Hesselink, Secretary; Henry Siebelink, Treasurer; Garret Gerlings, General Manager.
- Prime (The) Steel Company, Chicago road near Oklahoma ave., Milwaukee; branch offices, Chicago. Built in 1906; 8 Swedish 6-pot crucible furnaces; total number of pots, 48; number of pots that can be used at a heat, 16; first crucible steel made October 1, 1906; product, steel castings; annual capacity, 1,200 tons. Fuel, oil. O. L. Prime, President; John H. Tobin, Vice President; Charles J. Wild, Secretary and Treasurer.
- Smith (George H.) Steel Casting Company, Milwaukee; Chicago offices, 40 Dearborn st. Built in 1897; two 3-gross-ton special steel converters built in 1899; first steel made in April, 1899; destroyed by fire in February, 1902; immediately rebuilt and again put in operation April 22, 1902; again destroyed by fire April 29,

1904, and operations resumed September 21, 1904; product, steel castings; annual capacity, 5,000 tons. Four 4-pot crucible steel-melting furnaces; product, crucible steel castings; annual capacity, 500 tons. Fuel, coke and oil. George H. Smith, President and Manager; F. E. Hinners, Secretary and Treasurer. Selling agent, Marshall and McGookin Company, 40 Dearborn st., Chicago. Superior Branch, United States Cast Iron Pipe and Foundry Company, 71 Broadway, New York. Works at Superior, Wis. Built in 1890-1; two 4-gross-ton Bessemer steel converters, 5 heating furnaces, and 2 trains of rolls (one 30 x 90-inch train with 2 stands for plates and one 20-inch bar train); product, plates, structural shapes, and bars; annual capacity, 90,000 tons of ingots or 81,000 tons of rolled material. Fuel, producer gas and coal. George B. Hayes, President, and B. F. Haughton, Secretary and Treasurer, New York; George J. Long, Vice President, Louisville, Ky. (Formerly called the West Superior Branch.)—*The Bessemer converters and the rolling mill are idle and for sale or lease. A plant for the manufacture of cast-iron pipe is connected with these works and is not for sale.*

Number of rolling mills and steel works in Wisconsin: 16. Of these one has standard Bessemer converters, 2 make steel in special converters, 4 make open-hearth steel, and 10 can make crucible steel.

MINNESOTA.

COKE FURNACES—1.

Zenith Furnace, Zenith Furnace Company, Wolvin Building, Duluth. Furnace at West Duluth. One stack, 76 x 16, built in 1889-90; improved in 1899 and 1902; rebuilt in 1903; one 2-pass Foote and three Gordon-Whitwell-Cowper stoves; fuel, coke made at Duluth from Westmoreland and Youghiogheny coal; ores, Mesabi and Gogebic; product, Bessemer, malleable, and foundry pig iron; annual capacity, 80,000 tons. Brand, "Zenith." Connected with the furnace are 50 Otto-Hoffmann by-product coke ovens with an annual capacity of 90,000 tons; also a machine shop. A. B. Wolvin, President, and P. J. Davis, Secretary, Duluth; C. P. Wheeler, Vice President, Chicago; Fred. C. Harris, General Superintendent, West Duluth. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1907.*

Number of furnaces in Minnesota: one coke stack.

STEEL WORKS—2.

American Hoist and Derrick Company, St. Paul; branch offices, 60 South Canal st., Chicago; Taylor Building, New York; Hennen Building, New Orleans. One 2-gross-ton Tropenas steel converter

built in 1900; first steel made July 1, 1900; product, steel castings; annual capacity, 1,000 gross tons. Fuel, coke. Oliver Crosby, President; F. J. Johnson, Secretary; W. O. Washburn, Treasurer.

Washburn (The) Steel Castings and Coupler Company, Minneapolis. Built in 1905-6; one 7-gross-ton acid open-hearth steel furnace; first steel made February 24, 1906; product, car couplers and other castings; annual capacity, 4,200 tons. Fuel, oil. W. D. Washburn, President; Franklin M. Crosby, Vice President; C. C. Crane, Secretary and Treasurer; Edwin C. Washburn, General Manager.

Number of steel works in Minnesota: 2. Of these one makes Tropenas steel and one makes open-hearth steel. No rolling mills.

MISSOURI.

COKE FURNACES—1.

Missouri Furnace, The St. Louis Blast Furnace Company, Missouri Trust Building, St. Louis. Furnace at South St. Louis. One stack, No. 2, 76 x 15, built in 1869 and blown in in 1870; remodeled in 1887 and rebuilt in 1895; one Massicks & Crooke, one 4-pass Whitwell, and two Gordon-Whitwell-Cowper stoves; fuel, Connellsville or Virginia coke; ores, Missouri red and brown hematite; product, basic open-hearth, car-wheel, and foundry pig iron cast in chills; annual capacity, 45,000 tons. Brands, "Missouri" for basic and "Carondelet" for foundry. Arthur P. DeCamp, President; Frank B. DeCamp, Vice President and General Manager; William Yule, Secretary; Wallace P. Foote, Superintendent. Sole selling agents, DeCamp Brothers and Yule Iron, Coal, and Coke Company, St. Louis.—*Active in 1907.*

Number of coke furnaces in Missouri: one stack.

CHARCOAL FURNACES—1.

Sligo Furnace, Sligo Furnace Company, Syndicate Trust Building, St. Louis. Furnace at Sligo. One stack, 60 x 11, built in 1880 and rebuilt in 1891; Foote hot-blast stoves; ores, blue specular and red and purple oxide mined by the company near the furnace; product, foundry, car-wheel, and malleable pig iron; annual capacity, 25,000 tons. Brand, "Sligo." Charcoal kilns with an annual capacity of 2,160,000 bushels are connected with the furnace. C. L. Rogers, President and General Manager; S. S. DeLano, Treasurer; J. M. Buick, Secretary and Auditor; W. E. Hedgcock, Purchasing Agent. Sales made by the company.—*Active in 1907.*

Number of charcoal furnaces in Missouri: one stack.

Total number of furnaces in Missouri: 2 stacks. Of these one uses coke and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—6.

Granite Iron Rolling Mills Branch, National Enameling and Stamping Company, New York. Works at St. Louis.—*See page 218.*

Helmbacher Plant, Helmbacher Forge and Rolling Mills Company, St. Louis.—*See page 219.*

Hirsch Rolling Mill Company, National Bank of Commerce Building, St. Louis. Works at Ecoff ave. and Missouri Pacific Railroad tracks; supply warehouses, Second and Pine sts. Built in 1900 and first put in operation July 5, 1900; 7 heating furnaces, 2 forge fires, 3 trains of rolls, (one 18-inch muck, one combined 8 and 10-inch Belgian, and one 16-inch finishing,) and 2 spike machines; product, merchant and refined bar iron and steel; also iron and steel angles, shapes, spikes, bolts, light rails, etc.; annual capacity, 30,000 tons. Fuel, bituminous coal. Marcus A. Hirsch, President, Treasurer, and General Manager; V. R. Hirsch, Vice President; A. L. Hirsch, Secretary.

Kansas City (The) Bolt and Nut Company, Kansas City. Works at cor. of Independence and Bristol aves. Built in 1887-8 and first put in operation in January, 1889; 4 heating furnaces and 2 finishing trains of rolls (one 10 and 16-inch combination and one 10-inch); product, merchant bar and bolt iron; also machine and track bolts, nuts, rivets, forgings, etc.; annual capacity, 40,000 tons of bar iron and 30,000 tons of bolts, nuts, rivets, etc., which should come out of the bar iron capacity. Fuel, oil. A galvanizing plant is also operated. J. H. Sternbergh, President, and H. M. Sternbergh, Vice President, Reading, Pa.; H. R. Warren, Secretary and Treasurer, Solomon Stoddard, Manager, and George T. Cook, General Sales Agent, Kansas City, Mo.

St. Louis Steel Foundry, Curtis and Co. Manufacturing Company, Wellston P. O., St. Louis. Construction commenced in January, 1907; works equipped in August with two 3-gross-ton special side-blown Bessemer converters and 2 Whiting cupolas; in addition two 10-gross-ton basic open-hearth steel furnaces were being erected; first Bessemer steel made August 15, 1907; product, manganese, high-carbon, chrome, and soft castings of Bessemer and open-hearth steel; estimated annual capacity, from 4,000 tons to 5,000 tons of special Bessemer castings and from 5,000 tons to 8,000 tons of open-hearth castings. Fuel, manufactured gas or fuel oil. George F. Steedman, President; J. H. Steedman, Vice President; J. N. Maher, Manager.

Scullin-Gallagher Iron and Steel Company, Kraft st. and Manchester ave., St. Louis; sales agencies, No. 1 Wall st., New York; Fisher Building, Chicago; Syndicate Trust Building, St. Louis. Built in 1899-1900; nine 20-gross-ton basic open-hearth furnaces;

first steel made in September, 1900. Special modified Bessemer department added in 1906 and first steel made December 10, 1906; two 4-gross-ton converters and 2 cupolas. Product, miscellaneous steel castings and bolsters and couplers; annual capacity, 80,000 tons of open-hearth steel castings and 20,000 tons of converter castings. Fuel, manufactured gas and oil. John Scullin, Chairman; Harry Scullin, President; Thos. M. Gallagher, First Vice President; R. H. Weatherly, Third Vice President; Vol. C. Turner, Secretary and Treasurer.—*Bessemer converters idle.*

Number of rolling mills and steel works in Missouri: 6. Of these 2 make special Bessemer steel, one makes open-hearth steel, and one open-hearth steel plant is being built.

KANSAS.

ROLLING MILLS—1.

Kansas City Plant, (leased,) American McKenna Process Company, Milwaukee. Works at Kansas City, Kansas. (Owned and formerly operated by the McKenna Steel Working Company.)—*Page 123.* Number of rolling mills in Kansas: one. No blast furnaces.

COLORADO.

COKE FURNACES—6.

Minnequa Furnaces, The Colorado Fuel and Iron Company, Denver. Furnaces at Pueblo. Six stacks; fuel, coke.—*See page 226.* Number of furnaces in Colorado: 6 coke stacks. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—2.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo.—*See pages 226-28.* Western Rolling Mills Company, lessee, Shoshone and Mulberry sts., Denver. Built in 1894; improved in 1900; 4 coal-fired heating furnaces and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron, bolts, and 8, 12, 16, and 20-lb. T rails; annual capacity, 15,000 tons. Fuel, coal. A. Goodstein, President. (Formerly owned and operated by the Union Iron and Steel Company; acquired by the Western Iron Mills Company; leased by the Western Rolling Mills Company in 1907.)

Number of rolling mills and steel works in Colorado: 2. Of these one makes Bessemer and open-hearth steel ingots and castings.

IDAHO.

PROJECTED ELECTRIC PLANTS.

American Falls Electric Smelting and Refining Company, Pocatello, Bannock county. Contemplates making pig iron and steel by

electricity at American Falls. J. H. Brady, President; F. C. Stanford, Treasurer; M. E. Hughes, Secretary.
Number of projected electric plants in Idaho: one.

WYOMING.

ROLLING MILLS—1.

Laramie Rolling Mill, Union Pacific Railroad Company, Laramie.

Built in 1874-5 and put in operation in April, 1875; 5 heating furnaces, one puddling furnace, one squeezer, 2 trains of rolls, (one 10 and one 19-inch,) one track spike machine, one rivet machine, 2 nut machines, 2 bolt headers, 4 bolt cutters, 2 nut tappers, and 2 bolt threading machines; product, bar iron, all consumed in the manufacture of tie plates, railroad spikes, bolts, nuts, rail joints, etc., by the company; annual capacity, 20,000 tons of rolled products. Fuel, coal.

Number of rolling mills in Wyoming: one. No blast furnaces.

WASHINGTON.

CHARCOAL FURNACES—1.

Irondale Furnace, The Irondale Furnace Company, Irondale, via Port Townsend, Jefferson county. One stack, 60 x 11, built in 1880-1 and blown in January 27, 1881; rebuilt in 1882-3, remodeled in 1884, and rebuilt in 1906-7; closed top with patent bell and hopper; two iron stoves (one 30-pipe and one 60-pipe); fuel, charcoal; ores, magnetite and bog from the company's mines on Vancouver Island and in the State of Washington; product, foundry pig iron; also low-phosphorus Bessemer pig iron suitable for the manufacture of steel castings; annual capacity, 24,000 tons. Also operates charcoal kilns and by-product retorts. J. A. Moore, President, Seattle; William Price, General Manager, and Jacob Sprow, Superintendent, Irondale. (Formerly owned by the Pacific Steel Company.)—*Active in 1907.*

Number of furnaces in Washington: one charcoal stack.

ROLLING MILLS AND STEEL WORKS—2 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Cascade Steel Foundry, Cascade Steel Foundry Company, 1201 Alaska Building, Seattle. Building works at Earlington, about ten miles from the centre of Seattle, to be equipped with one 10-gross-ton Siemens basic stationary open-hearth steel furnace; product, steel castings and ingots; estimated annual capacity, 10,000 tons. Fuel, California crude oil atomized by steam. Maurice D. Leehey, President; James F. McElroy, Vice President; T. F. Ryan, Treasurer; A. W. Henry, Secretary and Manager.

Seattle Steel Company, Youngstown. Built in 1904-5 and first put in operation May 6, 1905; 6 busheling furnaces, 5 heating furnaces, and 3 trains of rolls (one 9, one 12, and one 16-inch); the 9 and 16-inch trains were removed from the company's dismantled plant at Lakeview, Washington; product, bar iron, flats, rounds, squares, and 8, 12, 16, and 20-lb. T rails; annual capacity, 15,000 tons. Fuel, coal and petroleum. E. M. Wilson, President and General Manager; William Pigott, Vice President and Treasurer; W. S. Burt, Secretary.

Shaw Crucible Steel Company, 606 L st., Hoquiam. Works at Damon. Originally built in 1905-6; one special furnace for manufacturing steel direct from the magnetic black sands of the Pacific Coast by what is known as the "simple reduction system;" first steel made in August, 1906; completely destroyed by fire in September, 1906; immediately rebuilt and operations resumed in May, 1907; product, ingots for tool steel. Fuel, oil. S. Percy Wells, President, John A. Ringold, Secretary, and A. R. Witham, Treasurer, Cincinnati, Ohio; E. H. Rother, General Manager, Hoquiam.

PROJECTED ROLLING MILLS.

Vulcan (The) Iron Works, Seattle. Now manufacture all classes of machinery and iron and steel bolts and nuts; contemplate adding rolls for the manufacture of bar iron, etc.

Number of rolling mills and steel works in Washington: 2 completed, one building, and one projected. Of these one makes steel by a special process direct from black sand and one open-hearth plant to make steel ingots and castings is being built.

OREGON.

CHARCOAL FURNACES—1.

Oswego Furnace, Oregon Iron and Steel Company, Oswego; main offices and telegraph address, Sherlock Building, Portland. One stack, 60 x 13, built in 1888 and first blown in in October, 1888; three Whitwell stoves; annual capacity, 15,000 tons. The company owns and operates a cast-iron pipe foundry at Oswego. William M. Ladd, President; Charles E. Ladd, Vice President; A. S. Pattullo, Secretary and General Superintendent.—*Furnace idle since 1894; cast-iron pipe foundry in constant operation.*

Number of furnaces in Oregon: one charcoal stack.

ELECTRIC PIG IRON AND STEEL PLANTS.

Black Sand and Gold Recovery Company, Marquette Building, Chicago. One experimental furnace erected at Hood River in 1907 for the manufacture of pig iron and steel direct from black

sand by electricity and charcoal; pig iron and steel first made in March, 1907; daily capacity, about 5 tons. W. H. Dyrenforth, President; George A. Chritton, Vice President; F. E. Hayne, Treasurer; J. H. McFarland, Secretary.—*Active in 1907.*

Number of electric pig iron and steel plants in Oregon: one.

ROLLING MILLS AND STEEL WORKS—2 COMPLETED AND 1 PROJECTED.

Columbia Steel Company, Tenth and Johnson sts., Portland. Built in 1903 and first steel made May 1, 1903; one 2-gross-ton surface-blown steel converter, with special arrangement of tuyeres, 2 cupolas, and one annealing furnace; product, steel castings; annual capacity, 1,800 tons. Fuel, oil and coke. Contemplates erecting a new steel casting plant at Linnton, near Portland. S. M. Mears, President; R. R. Hoge, Vice President; Charles M. Gunn, Manager; Taylor Goodrich, Secretary and Treasurer. (Formerly called the Columbia Engineering Works, Incorporated; name changed to Columbia Steel Company on March 1, 1907.)

Rolling Mill Department, Pacific Hardware and Steel Company, Townsend and Seventh sts., San Francisco; branch offices, 40 Dearborn st., Chicago, and Postal Telegraph Building, New York. Works at Portland, Oregon. Built in 1892 and first put in operation in September, 1892; 2 heating furnaces, one busheling furnace, and 2 trains of rolls (one 3-high 9-inch and one 3-high 16-inch); product, bar and band iron; annual capacity, 12,000 tons. Fuel, crude oil. A. L. Scott, President, H. J. Morton, First Vice President, Joseph Sloss, Second Vice President and Treasurer, and W. C. McCloskey, Secretary, San Francisco.

Number of rolling mills and steel works in Oregon: 2 completed and one projected. Of these one makes surface-blown steel castings and one steel casting plant is projected. In addition one plant makes steel by electricity from black sand.

CALIFORNIA.

ELECTRIC PIG IRON PLANTS.

Noble Electric Steel Company, Union Square Building, San Francisco. Works at Heroult-on-the-Pitt, Shasta county, (P. O. address, Baird.) One Heroult electric furnace built in 1907; first pig iron made in July, 1907; fuel, electricity and charcoal; ore, local magnetite; product, foundry pig iron and ferro-silicon; annual capacity, 4,500 tons. H. H. Noble, President; E. V. D. Johnson, Vice President; C. B. Morgan, Secretary.—*Active in 1907. See Projected Steel Works in California, page 407.*

Number of electric pig iron plants in California: one.

ROLLING MILLS AND STEEL WORKS—7 COMPLETED, 2 BUILDING, AND 2 PROJECTED.

- California Industrial Company's Bar Iron Rolling Mills, California Industrial Company, Fourth st. and Santa Fé ave., Los Angeles. Built in 1893-4 and put in operation August 27, 1894; idle for several years; revived in 1902 and put in operation by the present owners on June 17, 1902; 2 double busheling furnaces, 3 heating furnaces, one squeezer, 2 trains of rolls, (9 and 20-inch,) and one 5,000-lb. hammer; product, merchant bar iron; annual capacity, 15,000 tons. Fuel, crude oil with superheated steam. Also operate bolt and nut and electro-galvanizing departments. Brand, "C. I. Co." J. S. Torrance, President; W. L. Stewart, First Vice President; S. I. Merrill, Secretary and General Manager.
- Doble (Abner) Company, cor. Fremont and Howard sts., San Francisco. Building two 5-gross-ton basic Wellman rolling furnaces and one Wellman electric charging machine; product, steel castings; annual capacity, 6,000 tons. Fuel, crude oil. Now operates forge and machine shops; the forge shop is equipped with several hammers and one double 10-ton electric traveling crane, and the machine shop with heavy modern tools, all motor driven.
- Judson Manufacturing Company, Emeryville; offices and sales-rooms, 819 Folsom street, San Francisco. Built in 1882; 5 oil heating furnaces, 4 trains of rolls, (two 10 and two 16-inch,) 15 cut-nail machines, and 16 wire-nail machines; product, rails, bar iron, tack and nail plate, tacks, fine lath and cut nails, wire nails, structural and agricultural shapes, bolts and spikes, cold-drawn shafting, and iron castings; annual capacity, single turn, 11,000 tons of finished iron, 25,000 kegs of cut nails, 35,000 kegs of wire nails, 1,000 tons of tacks, 1,200 tons of bolts and spikes, 18,000 tons of bridge and house work, 1,000 tons of cold-drawn shafting, and 2,000 tons of castings. Fuel, oil. Brand, "Judson." H. E. Bothin, President; H. W. Gallett, Vice-President; J. D. Osborne, Secretary.
- Mare Island Navy Yard, Mare Island. Building: one 2-gross-ton Tropenas converter and one cupola; first steel will probably be made in February, 1908; product, steel castings for ship work for the use of the United States Navy; annual capacity, about 1,200 tons. Fuel, coke and oil. H. A. Evans, Naval Constructor.
- Pacific Jupiter Steel Company, 140 First st., San Francisco. Works at South San Francisco. One 10-gross-ton acid open-hearth steel furnace built in 1903; first steel made November 26, 1903; two 8-pot oil-melting crucible steel furnaces added in 1907; first crucible steel made July 1, 1907; 16 crucible pots can be used at a heat; product, all kinds of steel castings; annual capacity, 8,000 tons of open-hearth and 500 tons of crucible steel castings.

Fuel, oil. Constant Meese, President and General Manager; Warren R. Payne, Vice President; R. H. Brotherton, Secretary; B. D. Pike, Treasurer.

Potter, John A., Los Angeles. One 12-gross-ton reverberatory furnace for making steel direct from native iron ore, with crude petroleum as fuel, built in May, 1907; first steel made on August 7, 1907; daily capacity, 12 tons of ingots, castings, etc.

Rudgear Steel Company, cor. Bay and Stockton sts., San Francisco. Works built in 1900; one open-hearth steel furnace and one train of rolls added in 1906-7; plant now contains one 15-gross-ton basic open-hearth steel furnace, 2 heating furnaces, and one 3-high 12-inch bar mill; first products rolled March 4, 1907, and first open-hearth steel made April 11, 1907; product, ingots, angles, rounds, and squares; annual capacity, 9,000 tons of ingots and 15,000 tons of rolled products. Fuel, crude oil. A. Rudgear, President; James F. Leahy, Vice President; A. J. Merle, Treasurer; W. A. Rudgear, Secretary. (Formerly operated by the A. Merle Company; acquired by the present company in 1907.)

Southern Pacific Company Rolling Mill, Southern Pacific Company, Sacramento. Built in 1881; 15 heating furnaces, 4 trains of rolls, (two 12 and two 18-inch,) and 6 hammers; product, all kinds of bar and shaped iron, including I beams, angle iron, etc.; annual capacity, 25,800 tons of rolled and 4,000 tons of forged products. Fuel, oil. Brand, "S. P. Co." A gray iron foundry for the manufacture of castings for locomotives, cars, and steamer repair work is connected with the plant; also locomotive and car repair shops.

Union Iron Works Company, San Francisco. Works at Potrero. Controlled by the Bethlehem Steel Corporation.—*See page 108.*

PROJECTED ROLLING MILLS AND STEEL WORKS.

Great Western Rolling Mills Company, Rodeo. Contemplates erecting works at Rodeo for the manufacture of hot rolled iron and steel and perhaps open-hearth steel ingots and castings. N. Ohlandt, President, J. Martin, Secretary, Hansford Building, and A. Alper, General Manager, 75 Folsom st., San Francisco.

Noble Electric Steel Company, Union Square Building, San Francisco. Contemplates erecting at Heroult-on-the-Pitt, Shasta county, (post-office address, Baird,) one furnace for the manufacture by electricity and charcoal of steel castings direct from the ore.—*See Electric Pig Iron Plants in California, page 405.*

Number of rolling mills and steel works in California: 7 completed, 2 building, and 2 projected. Of these one makes Tropenas steel castings and one Tropenas steel plant is being built; 2 make open-hearth steel, one open-hearth steel plant is being built, and

one open-hearth steel plant is projected; one makes crucible steel, one plant makes steel by a special process, and one plant to make steel castings by electricity and charcoal is projected.

UNITED STATES.

Total number of blast furnaces in the United States in November, 1907, which were then active or may some time be put in blast: 448. Of these 322 use coke alone for fuel, 10 use coke alone and occasionally anthracite coal and coke mixed, one uses coke principally but sometimes charcoal alone, 5 use bituminous coal and coke mixed, 4 use anthracite coal alone, 53 use anthracite coal and coke mixed, 3 use anthracite coal and coke mixed and occasionally coke alone, 49 use charcoal alone, and one uses charcoal and coke mixed. There were also 7 plants equipped to make ferro-silicon, etc., by electricity and one electric plant was projected. In addition there were 28 blast furnaces being built, one furnace was to be revived, and 26 furnaces were projected. Two furnaces were also partly erected and work suspended.

Total in June, 1904: 428 completed furnaces and 2 electric plants.

Total number of bloomaries in the United States in November, 1907, which made hammered blooms, etc., for sale: 11. No forges.

Total in June, 1904: one forge and 8 bloomaries.

Total number of rolling mills and steel works in the United States in November, 1907: 598 completed, 15 building, 2 partly erected, and 15 projected. Of these 30 have standard Bessemer steel plants, one has a Clapp-Griffiths steel plant, 2 have Robert-Bessemer steel plants, 20 have Tropenas steel plants, one Tropenas steel plant is being built, 2 Tropenas steel plants are projected, one has a Book-walter steel plant, 16 plants make steel in Zenzes, Wills, and other special Bessemer converters, one modified Bessemer steel plant is being built, one plant to make Adams side-blown steel is partly erected, and 2 plants to make steel in special Bessemer converters are projected; 159 have open-hearth steel plants, 13 open-hearth plants are being built, 2 open-hearth plants are partly erected, and 7 open-hearth steel plants are projected; 79 have crucible steel plants, 2 crucible steel plants are being built, and 2 crucible steel plants are projected; 6 have plants for making cemented or blister steel and one plant to treat castings by the cementation process is projected; 9 have plants for making special steel, 3 have plants for making McHaffie steel, 3 make steel by electricity, and 2 electric steel plants are projected.

Total number of completed works in June, 1904: 572.

INACTIVE, ABANDONED, OR DISMANTLED IRON AND STEEL WORKS.

This list chiefly embraces blast furnaces, rolling mills, steel works, and forges and bloomeries which have been abandoned or dismantled since the Directory for 1904 appeared. It also embraces a number of works which were classified as abandoned in previous editions of the Directory but which have since been dismantled. In addition it embraces a few works which were included in the active list in the Directory for 1904 but which have since been inactive and are not likely to resume operations in the near future. Some of the establishments named below are still equipped with fair machinery, but nearly all have been permanently abandoned or dismantled. When companies or individuals are mentioned it is to be understood that they were the owners at the time the properties were reported to us as inactive, abandoned, or dismantled.

MASSACHUSETTS.

BLAST FURNACES.

Van Deusenville Furnace, Van Deusenville. One stack, 32 x 9½, built in 1834.—*Dismantled in 1906.*

ROLLING MILLS AND STEEL WORKS.

Massachusetts Steel Casting Company, Everett. Works at West Everett. Six crucible steel-melting furnaces; product, steel castings.—*Crucible furnaces dismantled in 1906. See pages 233-34.*
Mount Hope Iron Works, Mount Hope Iron Company, Somerset. Built in 1875; product, cut nails, skelp iron, etc.—*Dismantled.*

CONNECTICUT.

BLAST FURNACES.

Sharon Valley Furnace, Barnum Richardson Company, Lime Rock. Furnace at Sharon Valley. One stack, 31 x 9½; very old.—*Dismantled in 1903-4. See pages 111-12 for remaining furnaces.*

STEEL WORKS.

Omega (The) Steel Company, New Haven. Built in 1902; two special furnaces for making tool steel.—*Dismantled in 1904.*

NEW YORK.

BLAST FURNACES.

Burden Iron Works, The Burden Iron Company, Troy. Two stacks, each 60 x 14½: No. 1 built in 1865 and No. 2 in 1867.—*No. 2 dismantled in 1904 and No. 1 in 1905. See page 112.*

MISCELLANEOUS.

Ruthenburg (The) Reduction Company, Niagara Falls. One reducing tower, 30 x 7, built in 1904 and first put in operation in May, 1905; product, low-sulphur and low-phosphorus melting stock.—*Abandoned. Not described in the 1904 Directory.*

IRON-ORE FORGES.

Standish Iron Works, The Delaware and Hudson Company, Chatteaugay Ore and Iron Department, Standish. Built in 1895; product, charcoal blooms and billets direct from the ore.—*Abandoned.*

ROLLING MILLS AND STEEL WORKS.

Astoria Steel Company, Astoria. Built in 1900; two basic open-hearth steel furnaces; first steel made August 1, 1900; product, steel castings.—*Dismantled.*

Baldwin Steel Company, Cold Spring-on-Hudson. Built in 1903; one crucible steel-melting furnace; product, tool steel.—*Dismantled in 1907. See pages 330-31. Not described in the 1904 Directory.*

Breaker Island Works, American Steel and Wire Company of New Jersey, Cleveland. Works on Breaker Island, N. Y. Bessemer department built at Troy in 1864 and removed to Breaker Island and enlarged in 1896; three 15-gross-ton basic converters; product, billets, blooms, slabs, and skelp.—*Dismantled in 1907.*

Chrome Steel Works, Brooklyn. Built in 1869; product, crucible tool steel, burglar-proof welded chrome steel, crucible chrome steel castings, etc.—*Dismantled in 1905. See page 252.*

Hyle Brothers Steel Company, Syracuse. Two ovens for changing iron castings into steel.—*Abandoned. Not described in 1904 Directory.*

Hyle (The) Steel Tool Company, Syracuse. Built in 1903-4; special ovens for changing iron castings into steel castings.—*Abandoned.*

Onondaga Steel Works, Sweet's Steel Company, Syracuse. Built in 1863; product, bar steel.—*Dismantled in 1904. See pages 278-79.*

Syracuse Works, American Steel Casting Company, Geddes. Built in 1886; open-hearth furnaces added in 1890; castings.—*Dismantled.*

NEW JERSEY.

BLAST FURNACES.

Hudson County Furnace, New Jersey Zinc Company, New York. One furnace in Hudson county.—*Dismantled. See pages 119-20.*

ROLLING MILLS AND STEEL WORKS.

American Sheet Iron Works, Phillipsburg. Built in 1867; product, sheet iron and sheet steel.—*Destroyed by fire in 1904; abandoned.*

Janson Steel and Iron Company, Oxford. Built in 1866 and rebuilt in 1900; product, bar iron and steel.—*Dismantled in 1905. See page 283.*

New York Switch and Crossing Company, Hoboken. One acid open-hearth furnace built in 1894; steel castings.—*For sale.*
Trenton (The) Iron Company, Trenton. Built in 1845; product, wire rods, etc.—*Hot trains dismantled in 1905. See pages 54-55.*

PENNSYLVANIA.

BLAST FURNACES.

Allentown Iron Company, Allentown. Two stacks: No. 4, 60 x 16½, and No. 5, 60 x 17.—*Dismantled in 1905.*
Crane Furnace, Crane Iron Works, Catasauqua. One stack, E No. 6, 60 x 16.—*Dismantled in 1904. See pages 127-28.*
Danville Bessemer Furnace, Danville. One stack, 60 x 16, built in 1869.—*Dismantled in 1906.*
Edith Furnace, American Steel and Wire Company of New Jersey, Cleveland. Furnace in Allegheny City. One stack, 75 x 16½, built in 1882.—*Abandoned; now used as a dust catcher.*
Greenwood Furnace, Logan Iron and Steel Company, Burnham. Furnace at Greenwood Furnace P. O., Huntingdon county. One stack, 50 x 11, built in 1864.—*Dismantled.*
Hokendauqua Furnace No. 4, The Thomas Iron Company, Easton. Furnace at Hokendauqua. One stack, 65 x 17, built in 1863.—*Abandoned in 1902. See page 129 for remaining furnaces.*
Lehigh Iron and Steel Company, Allentown. One stack, No. 2, 60 x 15, completed in 1872.—*Being dismantled. See page 260.*
Northside Iron Company, Incorporated, Sharpsville. One stack, 35 x 7, built in 1902.—*Dismantled in 1906.*
Pioneer Furnaces, Eastern Steel Company, Pottsville. Two stacks: No. 2, 60 x 13, built in 1866, and No. 3, 65 x 14, built in 1872.—*Dismantled in 1904 and 1905.*
Sheridan Furnace, Berkshire Iron Works, Sheridan. One stack, No. 1, 78 x 15, built in 1862.—*Practically dismantled in 1905-6. Page 264.*

ROLLING MILLS AND STEEL WORKS.

Allentown (The) Rolling Mills, Allentown. Built in 1860; product, iron angles, merchant bars, etc.—*Dismantled in 1906.*
Altoona Foundry and Machine Company, Altoona. One acid open-hearth steel furnace built in 1901.—*Dismantled in 1904.*
American Production Company, Reynoldsville. Contemplated building crucible and open-hearth furnaces.—*Furnaces never built.*
Anchor Mills, Nineteenth st., South Side, Pittsburgh. Built in 1842; product, muck bar, skelp, steel sheets, etc.—*Dismantled in 1905.*
Atlantic Tool Steel Company, Huff Station, near Greensburg. Built in 1899-90; one crucible steel-melting furnace; product, rolled and hammered tool steel, etc.—*Idle; partly dismantled in 1907.*

- Atlantic Works, Republic Iron and Steel Company, Pittsburgh. Works at New Castle. Established in 1838; product, merchant bar iron and skelp.—*Dismantled in 1905.*
- Beaver Falls Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Beaver Falls. Built in 1875; one crucible steel-melting furnace and two converting furnaces.—*Dismantled.*
- Columbia Iron and Steel Foundry, W. J. Carlin Company, Pittsburgh. Built in 1900-1; one acid open-hearth steel furnace; product, steel castings.—*Dismantled in 1905.*
- Danville Bessemer Company, T. J. Price, Trustee, Danville. One acid open-hearth steel furnace built in 1882-3.—*Dismantled in 1905. See Pennsylvania Brake Beam Company, page 278.*
- Duncansville Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Duncansville. Built in 1839; product, merchant bars.—*Dismantled in 1905.*
- Easton Sheet Iron Works, George J. Newton, Philadelphia. Works at Easton. Steel and refined iron sheets.—*Dismantled in 1905.*
- Eddystone Engineering Works, Tindel-Morris Company, Eddystone. Built in 1901; contemplated adding an open-hearth steel furnace.—*Construction of furnace not commenced down to November, 1907.*
- Eleanor (The) Iron and Steel Company, Butler. Commenced the erection of an open-hearth steel plant and a rolling mill in the summer of 1903; work suspended.—*Dismantled.*
- Eleanor Iron and Steel Works, Irwin. Built in 1901-2; product, muck bar and skelp.—*Dismantled in 1907.*
- Exeter Rolling Mill, Reading. Built in 1892; product, skelp, socket, and bar iron.—*Dismantled in 1907.*
- Fairmount Steel Works, Alexander Foster & Co., Philadelphia. Built in 1866; six crucible steel-melting furnaces; product, hammered frog plates and points, forgings, etc.—*Dismantled in 1905.*
- Green Ridge Iron Works, Susan Spencer, owner, Scranton. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; product, bar iron, mine-car axles, etc.—*Idle for years.*
- Hussey Steel Works, Union Spring and Manufacturing Company, New Kensington. Built in 1891; product, bars, etc.—*Dismantled.*
- Keystone Rolling Mill, Second ave. near Morris st., Soho, Pittsburgh. Built in 1865; product, cotton-ties, etc.—*Dismantled in 1903-4.*
- Logan Manufacturing Company, Phoenixville. Built in 1899-1900; two Tropenas converters; product, castings.—*Dismantled in 1905.*
- New Castle Works, American Steel and Wire Company of New Jersey, Cleveland. Works at New Castle, Pa. Built in 1887; product, wire rods, wire, and wire nails.—*Dismantled in 1905.*
- Nittany Iron Company, Bellefonte. Built in 1798; product, muck bar.—*Dismantled in 1904.*

- Plymouth (or Stanford) Rolling Mills, Conshohocken. Built in 1881-2; product, muck bar and black plates.—*Dismantled*.
- Pottstown Iron Works, Glasgow Iron Company, lessee, Pottstown. Steel works built in 1885-6; three 10-gross-ton basic Bessemer converters.—*One converter dismantled in 1907. See pages 133-34.*
- Sharon Works, Republic Iron and Steel Company, Pittsburgh. Works at Sharon. Established in 1850; product, bar, band, hoop, and tank iron and light T rails.—*Dismantled in 1904-5.*
- Singer, Nimick & Co. Works, Crucible Steel Company of America, Pittsburgh. One acid open-hearth furnace.—*Dismantled. Page 165.*
- Star Works, American Sheet and Tin Plate Company, Pittsburgh. Built in 1895; product, black plates for tinning.—*Abandoned.*
- Sterlingworth Railway Supply Company, Easton. Built in 1900; product, deck beams.—*Dismantled in 1907. See page 262.*
- Timmes & Hecht Works, Scranton Bolt and Nut Company, Scranton. Built in 1901; bar iron, spikes, etc.—*Dismantled in 1905.*
- Totten and Hogg Iron and Steel Foundry Company, Pittsburgh. One acid open-hearth steel furnace; steel castings.—*Dismantled.*
- Twenty-sixth Street Works, American Steel and Wire Company of New Jersey. Works at Pittsburgh. Built in 1881; two Bessemer converters; product, ingots, blooms, etc.—*Dismantled in 1905.*
- Tyler (The) Tube and Pipe Company, Washington. One acid open-hearth steel furnace built in 1900. (Formerly owned by the Duncan Chemical Company.)—*Dismantled in 1906.*

DELAWARE.

ROLLING MILLS.

- Marshallton Iron and Steel Company, Incorporated, Marshallton. Built in 1836; product, sheet iron and steel.—*Dismantled in 1906.*

MARYLAND.

BLAST FURNACES.

- Deborah Furnace, Joseph E. Thropp, Earlston, Pa. Furnace at Catoctin Furnace, Frederick county, Md. One stack, 60 x 13, built in 1873-4.—*Dismantled in 1906-7.*

ROLLING MILLS AND BLOOMARIES.

- Maryland (The) Rail Company, Cumberland. Black plate mill added to a rolling mill in 1892; changed to a rail mill in 1902; product, light rerolled steel rails.—*Dismantled in 1906.*
- North East Works, McCullough Iron Company, Wilmington, Del. Works at North East, Md. Rolling mill built in 1847; product, sheet iron for galvanizing. Bloomary built in 1847 and 1875; product, charcoal blooms.—*Both works dismantled in 1904.*

VIRGINIA.

BLAST FURNACES.

Cedar Run Furnace, Graham & Robinson, Grahams Forge. One stack, 32 x 9, built in 1832.—*Virtually dismantled.*

ROLLING MILLS AND STEEL WORKS.

Crescent Horse Shoe and Iron Works, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Works at Max Meadows, Va. Built in 1892; product, bar iron.—*Dismantled in 1905. Machinery re-erected at Bristol, Va., in 1905-6. See page 193.*

Manchester Rolling Mill, Richmond Standard Steel Spike and Iron Company, Manchester. Built in 1888-9; product, bar iron for railroad and boat spikes.—*Virtually dismantled.*

Old Dominion Iron and Nail Works Company, Richmond. Two Bessemer steel converters and a blooming mill built in 1887.—*Converters and blooming mill dismantled. See page 329.*

WEST VIRGINIA.

ROLLING MILLS AND STEEL WORKS.

Kenton Iron and Steel Company, Covington, Ky. Works at Mason City, W. Va. Commenced in 1904; partly completed in 1905; product, bar iron and steel.—*Dismantled in 1907. See pages 331-32.*

Paden City Works, Carter Iron Company, Pittsburgh. Works at Paden City, W. Va. Two partly-erected open-hearth steel furnaces, (one acid and one basic.)—*Dismantled. For a description of the remainder of the works see pages 171-72.*

KENTUCKY.

BLAST FURNACES.

Paducah Furnace, Princess Furnace Company, Philadelphia. One stack at Paducah, 70 x 14, built in 1889-90.—*Dismantled in 1907.*

ROLLING MILLS AND STEEL WORKS.

Mitchell-Tranter Works, McDowell & Co., Allegheny, Pa. Works at Covington, Ky. Established in 1873; product, plate, channel, angle, merchant iron, etc.—*Dismantled in 1907.*

Watts Works, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Works at Middlesborough, Ky. Built in 1890-3; seven basic open-hearth steel furnaces and a blooming mill.—*Abandoned.*

TENNESSEE.

BLAST FURNACES.

New Chattanooga Furnace, Chattanooga. One stack, 60 x 14, completed and blown in in 1874.—*Dismantled in 1905.*

South Pittsburg Furnace, Tennessee Coal, Iron, and Railroad Company, Birmingham, Ala. Furnace at South Pittsburg, Tenn. One stack, No. 1, 70 x 18.—*Partly dismantled in 1903. See page 197.*
Warner Furnace, Bon Air Coal and Iron Company, Nashville. Furnace at Warner. One stack, 55 x 11.—*Abandoned. Page 338.*

STEEL WORKS.

Southern Steel Works, 610-14 Boyce st., Chattanooga. One acid open-hearth steel furnace built in 1900 or 1901; product, steel castings.—*Dismantled in 1904. See page 343.*

NORTH CAROLINA.

BLAST FURNACES.

Cherokee Furnace, Empire Steel and Iron Company, Catasauqua, Pa. Furnace at Greensboro, North Carolina. One stack, 70 x 16½, built in 1892.—*Dismantled.*
Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry. One stack, 50 x 11½, built in 1883-4.—*Dismantled in 1905-6.*

IRON-ORE FORGES.

Helton Forge, W. J. Pasley, Crumpler. Built in 1859; product, charcoal iron bars made direct from the ore.—*Dismantled.*

GEORGIA.

BLAST FURNACES.

Etna Furnace, Etna Steel and Iron Company, Etna, Polk county. One stack, 45 x 10, built in 1870.—*Dismantled in 1905.*

ALABAMA.

BLAST FURNACES.

Alice Furnace No. 1, Tennessee Coal, Iron, and Railroad Company, Birmingham. One stack, 75 x 15, built in 1879-80.—*Dismantled in 1905. See page 196.*
Bibb Furnace, Southern Mineral Land Company, Brierfield. One stack, 55 x 12, built in 1864.—*Virtually dismantled.*
Ensley Furnace No. 5, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnace at Ensley. One stack, 80 x 17, built in 1899-1900.—*Dismantled in 1905. See page 197.*
Gadsden-Alabama Furnace No. 1, Alabama Consolidated Coal and Iron Company, Birmingham. Furnace at Gadsden. One stack, 75 x 18, built in 1887-8.—*Dismantled in 1905. See pages 205-6.*

ROLLING MILLS AND STEEL WORKS.

Brierfield Rolling Mill, Southern Mineral Land Company, Brierfield. Built in 1863; product, bar iron and nails.—*Dismantled in 1907.*

Jefferson Steel Works, Union Iron and Steel Company, New York. Works at Birmingham, Ala. Built in 1889-90; one basic open-hearth steel furnace; product, ingots.—*Dismantled*.

Weller Rolling Mill and Forge Company, Anniston. Built in 1890-1; product, merchant iron and steel, light T rails, etc.—*Partly destroyed by fire in 1905. Rebuilt at Gadsden. See pages 352-53.*

OHIO.

BLAST FURNACES.

Cherry Valley Furnace, The Cherry Valley Iron Company, Leetonia.

One stack, 75 x 17, built in 1868.—*Dismantled in 1904. Page 175.*

Madison Furnace, The Southern Ohio Portland Cement Company, Toledo. Furnace at Rempel. One stack, 40 x 11, built in 1854; fuel, charcoal.—*Dismantled in 1906.*

New York Furnaces, Shawnee. Two stacks: one, 50 x 14, built in 1877, and one, 65 x 16, built in 1887.—*Dismantled in 1905.*

Scioto Furnace, Scioto Furnace P. O. One stack, 32 x 10½, built in 1826; fuel, charcoal.—*Dismantled.*

Vesuvius Furnace, Ironton Coal and Iron Company, Ironton. One stack, 33 x 10½, built in 1832.—*Dismantled in 1906.*

ROLLING MILLS AND STEEL WORKS.

Andrews Works, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown. Established at Niles in 1872 and removed to Haselton, a suburb of Youngstown, in 1880-1; product, iron and steel skelp, bars, and bands.—*Dismantled in 1905.*

Beaver Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Lisbon, Ohio. Built in 1894-5; product, black plates for tinning.—*Abandoned as an iron and steel rolling mill.*

Bechtold Crucible Steel Company, Canal Dover. Commenced building works to make crucible and open-hearth hammered and rolled products.—*Abandoned. Not described in the 1904 Directory.*

Canton Crucible Steel Works, Canton. Built in 1895; twelve crucible steel-melting holes; product, tool steel, wire-drawing plates, and steel castings.—*Dismantled in 1905.*

Canton (The) Saw Company, Canton. One crucible steel furnace; product, machine castings.—*Dismantled in 1904.*

Columbus Malleable Iron Works, Columbus. Built in 1900; two acid open-hearth steel furnaces.—*Open-hearth furnaces dismantled.*

Coxey Steel and Silica Sand Company, Mount Vernon. Built in 1900-1; two acid open-hearth steel furnaces; product, castings.—*Dismantled in 1905.*

Cuyahoga Falls Plant, The Acme Wire Company, Cuyahoga Falls. Built in 1901; product, wire rods, wire, wire nails, etc.—*Wire-rod trains and wire-nail machines dismantled in 1904.*

- Dennison Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Dennison, Ohio. Built in 1897; product, sheets for stamping and black plates for tinning.—*Dismantled in 1905.*
- Dithridge Steel Car Works, Dithridge Steel Car Company, Jersey City, N. J. Contemplated erecting open-hearth furnaces and trains of rolls at White City, Ohio.—*Project abandoned.*
- Eagle Works, Republic Iron and Steel Company. Works at Ironton. Established in 1852; product, bars and light rails.—*Dismantled in 1905.*
- Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio. Built in 1867; product, muck bar and sheet iron and sheet steel.—*Dismantled in 1904.*
- Girard Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Girard, Ohio. Built in 1872; product, iron and steel bars, small T rails, angles, channels, etc.—*Dismantled in 1905-6.*
- Independent Rolling Mill Works, Shenango Iron and Steel Company, Pittsburgh. Works at Cuyahoga Falls, Ohio. Built in 1902; product, muck bar, bar iron, etc.—*Dismantled in 1906.*
- National (The) Steel Castings Company, Cleveland. Contemplated building works at Ravenna for the manufacture of Tropenas steel castings.—*Project abandoned.*
- Newark Iron and Steel Company, Newark. One acid open-hearth steel furnace built in 1901; product, steel castings.—*Open-hearth furnace dismantled in 1907. See Newark Steel Plant, pages 372-73.*
- Ohio Rolling Mill, Findlay. Built in 1900; product, bar iron.—*Dismantled in 1905.*
- Toledo Works, (Factory D,) Shelby Steel Tube Company, Pittsburgh. Works at Toledo, Ohio. Built in 1896; product, blanks for making seamless-drawn steel tubes.—*Dismantled in 1905.*
- Warren Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Warren, Ohio. Built in 1870, burned in 1878, and rebuilt in 1879; product, bar iron, etc.—*Dismantled in 1905.*
- Zanesville Iron Works, Zanesville. Built in 1848; product, iron and steel bars, bands, and shapes.—*Dismantled in 1905-6.*

INDIANA.

ROLLING MILLS AND STEEL WORKS.

- Alexandria Works, Republic Iron and Steel Company, Pittsburgh. Works at Alexandria, Indiana. Established in 1893-5; product, muck and bar iron.—*Dismantled in 1904-5.*
- Central Steel Company, Indianapolis. Built in 1887; product, beams.—*Dismantled.*
- Central Works, Republic Iron and Steel Company. Works at Brazil, Ind. Established in 1882-3; product, bar iron.—*Dismantled.*

- Chicago Horse Shoe Works, John J. McCook, 120 Broadway, New York. Works at East Chicago, Indiana. Built in 1888-9; product, horseshoe bars and horse and mule shoes.—*Idle for several years. For equipment see 1904 Directory, page 330.*
- Chicago Steel Manufacturing Company, New Castle. Works originally built at Hammond, Indiana, in 1886-7; machinery removed to New Castle in 1904; destroyed by fire in November, 1904; product, shovel and nail plate, cut nails, etc.—*Dismantled.*
- Gould Steel Company, Anderson. Built in 1891-2; two acid open-hearth steel furnaces; product, steel castings.—*Dismantled.*
- Indiana Works, Republic Iron and Steel Company, Pittsburgh. Works at Muncie, Ind. Established in 1892; product, iron and steel bars.—*Trains of rolls dismantled in 1905.*
- Irontdale Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Middletown, Ind. Built in 1893-4; product, black plates for tinning.—*Dismantled in 1905.*
- Marion Works, Republic Iron and Steel Company, Pittsburgh. Works at Marion, Ind. Built in 1893; product, rods, etc.—*Dismantled.*
- Muncie Works, Republic Iron and Steel Company, Pittsburgh. Works at Muncie, Ind. Established in 1893; product, band and bar iron.—*Dismantled in 1905.*
- National Car Coupler Company, Converse. One acid open-hearth steel furnace built in 1898; product, freight and passenger car couplers, etc.—*Dismantled in 1906.*
- Peru Steel Casting Company, Peru. Built in 1899; two basic open-hearth furnaces; product, castings for machine and railroad work.—*Destroyed by fire in December, 1904; not rebuilt.*
- Terre Haute Works, Republic Iron and Steel Company, Pittsburgh. Works at Terre Haute, Ind. Established in 1868; product, bars, bands, and horseshoe and refined iron.—*Dismantled in 1904.*
- Wabash Works, Republic Iron and Steel Company, Pittsburgh. Works at Terre Haute, Ind. Established in 1874; product, bars, bands, horseshoe bars, etc.—*Dismantled.*
- Westerman Works, Republic Iron and Steel Company. Works at Marion. Built in 1890-1; product, bar iron.—*Dismantled.*
- Wetherald Works, Republic Iron and Steel Company, Frick Building Annex, Pittsburgh. Works at Frankton, Indiana. Built in 1893; product, bar and band iron.—*Dismantled in 1905.*

ILLINOIS.

BLAST FURNACES.

- Joliet Works, (old No. 3 Furnace,) Illinois Steel Company, Chicago. Furnace at Joliet. One stack, $78\frac{1}{2} \times 19\frac{1}{2}$, built in 1889-90.—*Dismantled in 1905. See page 25.*

ROLLING MILLS AND STEEL WORKS.

Aermotor Company, Chicago. Contemplated adding hot trains to a butt-welded pipe plant at Chicago Heights.—*Project abandoned.*

Chicago Malleable Castings Company, Chicago. Works at West Pullman. One basic open-hearth furnace; product, gears, pinions, and small steel castings.—*Open-hearth furnace dismantled.*

Sandwich Iron and Steel Company, (not incorporated,) Sandwich. Built in 1900; product, bar iron. B. Manfield, Proprietor.—*Idle and for sale. For equipment see 1904 Directory, page 340.*

Springfield Works, Republic Iron and Steel Company, Pittsburgh. Works at Springfield, Ill. Established in 1872; product, bar iron.—*Dismantled in 1906.*

Wells and French Works, American Car and Foundry Company, St. Louis. Works at Chicago. Special train of rolls added in 1902; product, steel railroad and street car wheels rolled from cast-steel discs.—*Rolls dismantled. See pages 222, 224, and 225.*

MICHIGAN.

BLAST FURNACES.

Peninsular Furnace, Fred L. Smith, Trustee, Detroit. One stack, 42 x 9½, built in 1863.—*Dismantled in 1905.*

STEEL WORKS.

Michigan Steel Casting Company, Detroit. Contemplated erecting an open-hearth steel casting plant at Delray.—*Project abandoned.*

WISCONSIN.

ROLLING MILLS AND STEEL WORKS.

Bay View Steel Casting Company, Milwaukee. Built in 1894; one acid open-hearth steel furnace added in 1897; product, castings.—*Dismantled in 1905. See page 396.*

Clinton and Burnham Foundry, Central Foundry Company, Milwaukee. Six crucible steel-melting furnaces built in 1902; product, machinery castings.—*Abandoned.*

Waukesha Sheet Steel Works, Waukesha. Built in 1901; product, black plates for tinning and galvanized sheets.—*Dismantled in 1906 and machinery removed to Canton, Ohio. See page 370.*

MINNESOTA.

ROLLING MILLS AND STEEL WORKS.

Duluth Car Works, Duluth. Built in 1888-9; product, bar iron, rods, bolts, and forgings.—*Dismantled in 1905-6.*

Ironton Structural Steel Works, Duluth. Built in 1892-3; product, structural steel. O. H. Simonds, Agent, Duluth.—*For sale.*

Minnesota Iron Works, Republic Iron and Steel Company, Pittsburgh. Works at Columbia Heights, Minn. Built in 1894-5; 3 basic open-hearth furnaces; product, bars, shapes, etc.—*Dismantled.*

MISSOURI.

BLAST FURNACES.

Jupiter Furnace, St. Louis. One stack, 75 x 20, completed in 1873 and first blown in in 1880.—*Dismantled in 1905.*

Ozark (The) Blast Furnace Company, Kansas City. Contemplated building a blast furnace near Springfield.—*Project abandoned.*

COLORADO.

STEEL WORKS.

Denver (The) Steel Casting Company, Denver. Contemplated making open-hearth steel castings at South Denver.—*Abandoned.*

UTAH.

BLAST FURNACES.

Utah (The) Iron and Mining Company, Ogden, Weber county. Contemplated erecting a blast furnace at Ogden.—*Project abandoned.*

WASHINGTON.

ROLLING MILLS.

Seattle Steel Company, Youngstown. Works at Lakeview. Built in 1894; product, merchant bar iron.—*Dismantled. See page 404.*

UNITED STATES.

Since June, 1904, 24 blast furnaces which were then enumerated in the active list have been dismantled, abandoned, or transferred to the inactive list. During the same period 88 rolling mills, Bessemer steel plants, open-hearth steel plants, crucible steel plants, and plants equipped for the manufacture of steel by special processes which were similarly enumerated have also been dismantled, abandoned, or transferred to the inactive list. In addition one charcoal forge has been similarly treated.

IRON AND STEEL WORKS ABANDONED FROM 1901 TO 1904.

From November, 1901, to June, 1904, 21 blast furnaces had been dismantled, abandoned, or transferred to the inactive list. During the same period 66 rolling mills, Bessemer steel plants, open-hearth steel plants, crucible steel plants, and plants equipped for the manufacture of steel by special processes had also been dismantled, abandoned, or transferred to the inactive list. In addition 2 forges and bloomaries had been similarly treated.

THE IRON AND STEEL WORKS

OF

THE UNITED STATES.

PART III—CLASSIFIED BY PRODUCTS.

In this division of the Directory the iron and steel works of the United States, except blast furnaces and bloomaries, are classified according to their products, for ready reference. In this classified list brief mention is also made of tinplate and terne plate works that do not make black plates and are not connected with rolling mills or steel works.

BESSEMER STEEL WORKS.

This list includes all works which produce steel ingots or castings by the standard acid Bessemer process, the Robert-Bessemer process, the Tropenas process, the Bookwalter process, the Wills process, and other minor Bessemer processes. Unless otherwise stated all the plants enumerated make ingots. A complete list of plants which are equipped to make steel castings will be found beginning on page 439.

MASSACHUSETTS—3.

Massachusetts Steel Casting Company, Everett. Works at West Everett. Two Tropenas converters; steel castings.—*For a description of these works see pages 233-34.*

Tremont Nail Company, West Wareham. One Clapp-Griffiths converter.—*Idle. See pages 234-35.*

Watertown Arsenal, Watertown. One Tropenas steel converter; product, steel castings only.—*For description see page 235.*

RHODE ISLAND—1.

Providence Steel Casting Company, Providence. Two Tropenas steel converters; steel castings.—*Idle; for description see page 236.*

CONNECTICUT—1.

Malleable Iron Fittings Company, Branford. One Tropenas converter; steel castings. Another converter may be added.—*For a description of these works see page 238.*

NEW YORK—3.

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. One Tropenas converter; steel castings.—*See page 243.*
Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. Two Tropenas converters; steel castings.—*See page 246.*
Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Four standard acid converters.—*See page 99.*

NEW JERSEY—3.

American Steel Corporation, Oxford. One Wills converter; steel castings. A second converter is being added.—*See page 251.*
Atha Steel Casting Company, Newark. Three top-blown acid converters; steel castings.—*See pages 251-52.*
New Jersey (The) Steel Company, Rahway. Three special Bessemer converters; steel castings.—*For description see page 253.*

PENNSYLVANIA—20 COMPLETED, 1 BUILDING, 1 PROJECTED.

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Three acid converters.—*See page 158.*
Birdsboro Nail Works, The E. and G. Brooke Iron Company, Birdsboro. Two tilting acid converters.—*Idle. See page 266.*
Cambria Steel Company, Philadelphia. Works at Johnstown, Pa. Four acid converters.—*See page 155.*
Carnegie Steel Company, Pittsburgh. Four Bessemer steel works in Pennsylvania. Ten acid converters.—*See pages 12-15.*
Duquesne Steel Foundry Company, Pittsburgh. Works at Kendall Station. Two Tropenas converters; steel castings.—*Pages 293-94.*
Fischer Foundry and Machine Works, George L. Fischer, Sr., Ford City. One side-blown converter; steel castings.—*See page 313.*
Fort Pitt Steel Casting Company, McKeesport. One modified Bessemer converter; steel castings.—*See pages 294-95.*
Keystone Driller Company, Incorporated, Beaver Falls. Building one modified Bessemer converter; steel castings.—*See page 305.*
Keystone Steel Foundry Company, Avonmore. One Fisher converter; steel castings.—*Idle. See page 315.*
National Transit Company, Oil City. One special acid converter; steel castings for the company's exclusive use.—*See page 317.*
National Works, Monongahela Steel Works, National Tube Company. Works at McKeesport. Three acid converters.—*See page 37.*
Penn Steel Casting and Machine Company, Chester. Two Tropenas converters; steel castings.—*See pages 273-74.*
Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Three acid converters.—*See page 145.*
Pottstown Iron Works, Glasgow Iron Company, Pottstown. Two basic converters.—*Idle. May be dismantled. See pages 133-34.*

Reading Steel Casting Company, Reading. Two Tropenas converters; steel castings.—*See page 270.*

Shoenberger Works, American Steel and Wire Company of New Jersey. Works at Pittsburgh. Two acid converters.—*See page 45.*

Velte Foundry and Machine Company, Pittsburgh. One modified Tropenas converter; steel castings.—*See page 301.*

Weimer Chain and Iron Company, Lebanon. Proposes to erect one top-blown Bessemer converter; steel castings.—*See page 285.*

Wharton, Jr., (William) & Co., Incorporated, Philadelphia. One Tropenas converter; steel castings.—*See page 259.*

DELAWARE—1 COMPLETED AND 1 PROJECTED.

Brylgon Steel Casting Company, New Castle. Four Bookwalter converters; steel castings.—*See pages 320-21.*

Tropenas Steel Company, New Castle. Contemplates erecting two Tropenas converters; steel castings.—*See page 322.*

MARYLAND—1.

Maryland Steel Company; general offices, Sparrows Point, Maryland, and Girard Building, Philadelphia. Works at Sparrows Point. Three acid converters.—*For description see page 148.*

DISTRICT OF COLUMBIA—1.

Naval Gun Factory, United States Navy Yard, Washington. One Tropenas converter; steel castings.—*For description see page 324.*

VIRGINIA—1.

Newport News Shipbuilding and Dry Dock Company, New York. Works at Newport News, Virginia. One Tropenas converter; steel castings.—*For a description of these works see page 329.*

WEST VIRGINIA—2.

Riverside Works, Steel Works, National Tube Company, Pittsburgh. Works at Benwood, West Virginia. Two acid converters.—*See page 38.*

Wheeling Steel Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood. Two acid converters.—*See page 190.*

KENTUCKY—1.

Ashland Steel Company, Incorporated, Ashland. Two acid converters.—*For a description of these works see page 336.*

TENNESSEE—1.

Southern Steel Works, Chattanooga. One Tropenas converter; steel castings.—*For a description of these works see page 343.*

ALABAMA—1.

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley. One acid Bessemer con-

verter for desiliconizing and decarburizing molten metal for the open-hearth steel furnaces of the company. Adding two removable acid Bessemer converters.—*For description see pages 198-99.*

OHIO—12 COMPLETED, 1 PARTLY ERECTED, AND 1 PROJECTED.

Bessemer Plant, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown. Two acid converters.—*See page 94.*

Bonney-Floyd (The) Company, Columbus. Works at South Columbus. One side-blown converter; steel castings.—*See page 370.*

Carnegie Steel Company, Pittsburgh. Four Bessemer steel works in Ohio. Eight acid converters.—*See pages 10, 11, 15, and 16.*

Lorain Works, The National Tube Company (of Ohio), Lorain. Two acid converters.—*See page 32.*

Lunkenheimer (The) Company, Cincinnati. May erect two Tropenas converters; steel castings.—*See pages 375-76.*

Marion (The) Steam Shovel Company, Marion. One Robert-Bessemer converter; steel castings for its own use.—*See page 372.*

Menough (The) Foundry Company, Incorporated, Wellsville. One partly erected side-blown Adams steel converter.—*See page 376.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Cleveland. Two acid converters.—*See pages 44-45.*

Sutton (The C. E.) Company, Toledo. Two Tropenas converters; steel castings.—*See page 362.*

West (The) Steel and Iron Casting Company, Cleveland. One Tropenas converter; steel castings.—*See page 363.*

Youngstown (The) Sheet and Tube Company, Youngstown. Two acid converters.—*For a description of these works see page 181.*

ILLINOIS—7.

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, N. J. Works at Chicago Heights. Three Tropenas converters; steel castings.—*See page 123.*

Crane Company, Chicago. One Zenzen converter; steel castings.—*See page 385.*

Illinois (The) Steel Company, Chicago. Two Bessemer steel works in Illinois. Six acid converters.—*See pages 26-28.*

Link-Belt Company, Chicago. One Zenzen converter; steel castings.—*See pages 386-87.*

Otis Elevator Company, New York. Works at Chicago. One Schwartz furnace; steel castings.—*See page 387.*

Wisconsin Steel Company, Chicago. Works at South Chicago. Two acid converters.—*For description see page 211.*

MICHIGAN—2.

Carroll (The) Foundry, Houghton. One modified Tropenas converter; steel castings.—*See page 392.*

Detroit (The) Steel Casting Company, Detroit. Two Robert-Bessemer converters; steel castings.—*For description see page 392.*

WISCONSIN—3.

Milwaukee Steel Foundry Company, Milwaukee. One special steel converter; steel castings. Building another converter.—*Page 397.*

Smith (George H.) Steel Casting Company, Milwaukee. Two special converters; steel castings.—*See pages 398-99.*

Superior Branch, United States Cast Iron Pipe and Foundry Company, New York. Works at Superior, Wis. Two acid converters.—*Idle and for sale or lease. For description see page 399.*

MINNESOTA—1.

American Hoist and Derrick Company, St. Paul. One Tropenas converter; steel castings only.—*See pages 399-400.*

MISSOURI—2.

St. Louis Steel Foundry, Curtis and Co. Manufacturing Company, St. Louis. Two side-blown Bessemer converters; castings.—*Page 401.*

Scullin-Gallagher Iron and Steel Company, St. Louis. Two special Bessemer converters; steel castings.—*Idle. See pages 401-2.*

COLORADO—1.

Colorado (The) Fuel and Iron Company, Boston Building, Denver. Works at Pueblo. Two acid converters.—*See pages 226-27.*

OREGON—1 COMPLETED AND 1 PROJECTED.

Columbia Steel Company, Portland. One surface-blown converter; steel castings. Contemplates erecting 2 surface-blown converters at Linnton, near Portland.—*For description see page 405.*

CALIFORNIA—1 COMPLETED AND 1 BUILDING.

Mare Island Navy Yard, Mare Island. Building one Tropenas converter; steel castings.—*See page 406.*

Union Iron Works Company, San Francisco. Works at Potrero. One Tropenas converter; steel castings.—*See page 108.*

UNITED STATES.

Total number of Bessemer steel works in the United States in November, 1907: 70 completed, 2 building, one partly erected, and 4 projected. Of the completed works 30 are standard Bessemer plants with 71 converters, one is a Clapp-Griffiths plant with one converter, 2 are Robert-Bessemer plants with 3 converters, 20 are Tropenas plants with 29 converters, one is a Bookwalter plant with 4 converters, one is a Wills plant with one converter, and 15 plants with 22 converters make steel by other minor Bessemer processes. Total number of completed converters: 130. In addition one side-blown Adams plant with one converter is partly erected, one modified Bessemer plant and one

Tropenas plant with one converter each are being built, and 2 Tropenas plants with 4 converters and 2 special Bessemer plants with 3 converters are projected. To existing plants 2 standard Bessemer converters and one Wills and one special converter are being added and one Tropenas plant may add another converter.

Total in June, 1904: 51 completed, one building, and 4 projected. Of the completed works 32 were standard Bessemer plants with 75 converters, one was a Clapp-Griffiths plant with one converter, 2 were Robert-Bessemer plants with 3 converters, 10 were Tropenas plants with 14 converters, one was a Bookwalter plant with one converter, one was an Evans-Wills plant with 2 converters, and 4 plants with 7 converters made steel by other minor special Bessemer processes. Total number of converters: 103.

OPEN-HEARTH STEEL WORKS.

Unless otherwise stated all the plants enumerated below make ingots. A complete list of plants equipped for the manufacture of open-hearth and other steel castings will be found beginning on page 439.

MASSACHUSETTS—4 COMPLETED AND 1 PROJECTED.

Massachusetts Steel Casting Company, Everett. Works at West Everett. Two acid furnaces; steel castings.—*See pages 233-34.*
 Security Construction and Engineering Company, Brookline. May build works at South Boston to make basic castings.—*Page 235.*
 South Works, American Steel and Wire Company of New Jersey. Works at Worcester. Four acid and 4 basic furnaces.—*See page 46.*
 Thomson-Houston Electric Company, Steel Foundry Department, West Lynn. Three acid furnaces; steel castings.—*See page 234.*
 Tremont Nail Company, West Wareham. Two basic furnaces.—*For a description of these works see pages 234-35.*

RHODE ISLAND—1.

Phillipsdale Plant, Washburn Wire Company, Phillipsdale. Two basic furnaces.—*For a description of these works see page 236.*

CONNECTICUT—3.

American (The) Tube and Stamping Company, Bridgeport. Three basic furnaces.—*See pages 237-38.*
 Malleable Iron Fittings Company, Branford. One acid furnace; steel castings.—*See page 238.*
 National Steel Foundry Company, New Haven. Two acid furnaces; steel castings.—*For a description of these works see page 110.*

NEW YORK—10 COMPLETED AND 1 PROJECTED.

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo.

Three acid furnaces; steel castings.—*See page 244.*

Elmira Steel Works, Lucknow Iron and Steel Company, lessee.

Works at Elmira. Two basic furnaces.—*See pages 114-15.*

Gould Coupler Company's Steel Plant, Gould Coupler Company,

Depew. Four basic furnaces; steel castings.—*See page 245.*

Halcomb Steel Company, Syracuse. One basic furnace.—*Pages 245-46.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York

City. Two acid furnaces; steel castings.—*See page 246.*

Lackawanna Steel Company, West Seneca, (post-office address, Buf-

falo.) Eleven basic furnaces.—*See page 100.*

Milliken Steel Works, Milliken Brothers, (Incorporated,) New York.

Works on Staten Island. Five basic furnaces.—*See pages 246-47.*

New York State Steel Company, Buffalo. Two basic furnaces.—

See page 247.

Niagara Forged Steel Company, Buffalo. Works at Depew. One

basic furnace.—*See pages 247-48.*

Osborne Works Rolling Mill, International Harvester Company, Chi-

cago. Works at Auburn. May erect 2 basic furnaces.—*Page 209.*

Wickwire Brothers, Cortland. Two basic furnaces.—*See page 249.*

NEW JERSEY—8.

Atha Steel Casting Company, Newark. Three furnaces (2 basic and one acid); steel castings.—*See pages 251-52.*

Atha Steel Works, Crucible Steel Company of America, Pittsburgh.

Works at Harrison, N. J. One acid furnace.—*See page 163.*

Chrome Steel Works, Chrome; telegraph address, Carteret. Three

furnaces, (2 acid and one basic.)—*See page 252.*

Kinkora Works, John A. Roebling's Sons Company, Trenton. Four

furnaces at Roebling, (2 acid and 2 basic.)—*See page 121.*

New Jersey (The) Steel Company, Rahway. One acid furnace;

steel castings.—*See page 253.*

Pardee (The C.) Works, Incorporated, Perth Amboy. Two basic

furnaces.—*See page 254.*

Passaic Steel Company, Paterson. Seven basic furnaces.—*Page 254.*

Reliance Steel Foundry Company, Delawanna. One acid furnace;

steel castings.—*For a description of these works see page 254.*

PENNSYLVANIA—76 COMPLETED, 4 BUILDING, 1 PARTLY
ERECTED, AND 3 PROJECTED.

Allegheny Steel Company, Pittsburgh. Works at Brackenridge.

Four basic furnaces.—*See pages 291-92.*

American Bridge Company, Pittsburgh. Two open-hearth steel

plants. One acid and 11 basic furnaces.—*See page 66.*

- American Duplex Steel Company, New York. Works at Bradford, Pa. One special basic furnace; Duplex castings.—*Pages 311-12.*
- American Sheet and Tin Plate Company, Pittsburgh. Two open-hearth steel plants. Twelve acid furnaces.—*See pages 61-62.*
- American Steel Foundries, Chicago. Four open-hearth plants in Pennsylvania which make steel castings only. Ten acid furnaces.—*See pages 126-27.*
- Bethlehem Steel Company, South Bethlehem. Two open-hearth steel plants. Seven acid and 14 basic furnaces.—*See pages 105-7.*
- Birdsboro Steel Foundry and Machine Company, Birdsboro. Two acid furnaces; steel castings.—*See page 266.*
- Brandywine Rolling Mills, Worth Brothers Company, Coatesville. One acid and 15 basic furnaces.—*See pages 141-42.*
- Cambria Steel Company, Philadelphia. Two open-hearth steel works in Pennsylvania. Two acid and 17 basic furnaces.—*See page 155.*
- Carbon Steel Company, Pittsburgh. Eight furnaces, (3 acid and 5 basic.)—*See page 292.*
- Carnegie Steel Company, Pittsburgh. Six open-hearth steel plants in Pennsylvania. One acid and 115 basic furnaces; also 18 building basic furnaces.—*See pages 11-16.*
- Chambersburg Engineering Company, Chambersburg. Three acid furnaces; steel castings.—*See page 281.*
- Chester Steel Castings Company, Philadelphia. Works at Chester. Two acid furnaces; steel castings.—*See page 272.*
- Chilled Roll Foundry Company Department, United Engineering and Foundry Company, Pittsburgh. Works at Vandergrift. Two acid furnaces; steel castings.—*See page 177.*
- Colonial Steel Company, Pittsburgh. Works at Colona. Two basic furnaces.—*See pages 304-5.*
- Crucible Steel Company of America, Pittsburgh. Six open-hearth steel works. Ten acid and 6 basic furnaces.—*See pages 162-65.*
- Damascus Crucible Steel Casting Company, New Brighton. One partly erected experimental acid furnace.—*See page 305.*
- Damascus Tool Steel Company, Pittsburgh. Works at Carnegie. One acid furnace.—*See page 293.*
- Donner, (Percy E.) Pittsburgh. Contemplates erecting twelve basic furnaces.—*See pages 301-2.*
- Duquesne Steel Foundry Company, Pittsburgh. Works at Kendall Station. Two acid furnaces; steel castings.—*See pages 293-94.*
- Eastern (The) Steel Company, Pottsville. Four basic furnaces.—*See page 268.*
- Federal Steel Foundry Company, Chester. Two acid furnaces; steel castings.—*See page 273.*
- Fischer Foundry and Machine Works, George L. Fischer, Sr.,

- 712 Empire Building, Pittsburgh. Works at Ford City. Building one acid furnace; steel castings.—*See page 313.*
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Three acid furnaces; steel castings.—*See page 294.*
- Fort Pitt Malleable Iron Company, McKees Rocks. Three acid furnaces; malleable iron castings.—*See page 294.*
- General Castings Company, Verona, (a suburb of Pittsburgh.) Two acid furnaces; steel castings.—*See page 295.*
- Harrisburg Pipe and Pipe Bending Company, Harrisburg. Three basic furnaces.—*See page 282.*
- Heany Fire Proof Wire Company, York. One acid furnace; steel castings.—*Idle. See page 282.*
- Hydraulic Machine Company, Pittsburgh. Two furnaces (one acid and one basic); steel castings.—*See pages 295-96.*
- Ivy Rock Steel Works, Alan Wood Iron and Steel Company, Philadelphia. Works at Ivy Rock. Nine basic furnaces.—*Pages 130-31.*
- Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown. Three acid furnaces; steel castings.—*See page 33.*
- Jones and Laughlin Steel Company, Pittsburgh. Two completed open-hearth steel plants in Pittsburgh and one plant projected near Aliquippa. One acid and 15 completed basic furnaces, 4 basic furnaces building, and 6 basic projected.—*See pages 158-59.*
- Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons, Tacony, Philadelphia. One basic furnace.—*See page 125.*
- Keystone Steel Foundry Company, Avonmore. One acid furnace; steel castings.—*See page 315.*
- Kidd Brothers and Burgher Steel Wire Company, Aliquippa. Con templates erecting one acid furnace.—*See pages 308-9.*
- Latrobe Plant, Railway Steel-Spring Company, New York. Works at Latrobe. Three acid furnaces.—*See page 179.*
- Lebanon Iron and Steel Company, Lebanon. One basic furnace. An additional basic furnace is projected.—*See page 283.*
- Lukens Iron and Steel Company, Coatesville. One acid furnace and 14 basic furnaces.—*See page 140.*
- McConway (The) and Torley Company, Pittsburgh. Three acid furnaces; steel castings.—*See page 296.*
- Mesta Machine Company, Pittsburgh. Works at West Homestead. Two acid furnaces; steel castings.—*See pages 296-97.*
- Midvale (The) Steel Company, Nicetown, Philadelphia. Acid and basic furnaces.—*See page 253.*
- Monessen Plant, Page Woven Wire Fence Company, Monessen. Three basic furnaces.—*See page 316.*
- Monessen Works, Pittsburgh Steel Company, Pittsburgh. Building 8 basic furnaces.—*See pages 168-69.*

- National Foundry Company, Erie. One acid furnace; steel castings.—*See page 317.*
- Open Hearth Steel Works, Central Iron and Steel Company, Harrisburg. Four basic furnaces.—*See page 150.*
- Penn Steel Casting and Machine Company, Chester. Three acid furnaces; steel castings.—*See pages 273-74.*
- Pennsylvania Malleable Company, Pittsburgh. Works at McKees Rocks. Five acid furnaces; steel castings.—*See page 298.*
- Pennsylvania (The) Steel Company, Philadelphia: Works at Steelton. Fifteen basic and 4 acid furnaces.—*See pages 145-46.*
- Phoenix (The) Iron Company, Philadelphia. Works at Phoenixville. Six basic and 2 acid furnaces.—*See page 132.*
- Pittsburgh Steel Foundry, Pittsburgh. Works at Glassport. Five furnaces (2 basic and 3 acid); steel castings.—*See page 298.*
- Pottstown Works, Stanley G. Flagg & Co., Philadelphia. Works at Pottstown. One acid furnace; malleable castings.—*Page 270.*
- Schoen Steel Wheel Company, Pittsburgh. Works at McKees Rocks. Building 4 basic furnaces.—*See page 300.*
- Seaboard Steel Casting Company, Chester. Three acid furnaces; steel castings.—*See page 274.*
- Sharon Foundry Company, Sharon. Works at Wheatland. One acid furnace; castings. Building another acid furnace.—*Pages 306-7.*
- Sharon Steel Hoop Company, Sharon. Five furnaces, (4 acid and one basic.)—*See page 307.*
- Sharon Works, National Malleable Castings Company. Works at Sharon. Five acid and 2 basic furnaces; steel castings—*Page 176.*
- Shoenberger Works, American Steel and Wire Company of New Jersey. Works at Pittsburgh. Three basic furnaces.—*See page 45.*
- Solid Steel Casting Company, Chester. Works at Lamokin. Two acid furnaces; steel castings.—*See page 274.*
- Standard (The) Steel Works Company, Philadelphia. Works at Burnham. Six acid furnaces.—*See page 289.*
- Sterling Steel Foundry Company, Pittsburgh. Works at Braddock. Two acid furnaces; steel castings.—*See page 300.*
- Sweet's Steel Company, Williamsport. Works at Newberry. Two basic furnaces.—*See pages 278-79.*
- Tidewater Steel Company, Chester. Works at Thurlow Station. Five basic furnaces.—*See pages 274-75.*
- Union Steel Casting Company, Pittsburgh. Two acid furnaces; steel castings.—*See page 300.*
- Vulcan Crucible Steel Company, Aliquippa. One acid furnace.—*See page 308.*
- West Leechburg Steel Company, Pittsburgh. Works at West Leechburg. Building two basic furnaces.—*See page 319.*

DELAWARE—2.

Baldt (The) Steel Company, New Castle. Three acid furnaces; steel castings.—*See page 320.*

Diamond State Steel Works, Wilmington. Five furnaces, (4 basic and one acid.)—*For a description of these works see page 321.*

MARYLAND—1.

Taylor (N. and G.) Company, Philadelphia. Works at Cumberland, Maryland. Two basic furnaces.—*See pages 323-24.*

DISTRICT OF COLUMBIA—1.

Ordinance Works, Firth-Sterling Steel Company, McKeesport, Pa. Works at Giesboro Manor, District of Columbia. Two furnaces, (one acid and one basic.)—*For description see page 173.*

VIRGINIA—1.

Loucks Iron and Steel Company, Incorporated, Roanoke. One basic furnace for refining pig iron.—*Open-hearth furnace idle. For a description of these works see page 328.*

WEST VIRGINIA—2 COMPLETED AND 1 BUILDING.

Follansbee Brothers Company, Pittsburgh. Works at Follansbee, W. Va. Two basic furnaces.—*See page 331.*

North American Steel Company, Belington. Building one basic furnace.—*See page 332.*

West Virginia Malleable Iron Company, Point Pleasant. One acid furnace used for melting iron for malleable iron castings but steel castings could be made.—*For description see page 333.*

KENTUCKY—1 BUILDING.

Andrews Steel Company, Newport. Building works at Andrews, near Newport; one acid and 2 basic furnaces.—*See page 335.*

TENNESSEE—1 PROJECTED.

LaFollette Coal, Iron, and Railway Company, LaFollette. Contemplates erecting basic open-hearth furnaces.—*See page 343.*

GEORGIA—1.

Atlanta Steel Company, Atlanta. Two basic furnaces.—*Pages 344-45.*

ALABAMA—5.

Birmingham Steel and Iron Company, Birmingham. One basic furnace.—*See pages 351-52.*

Gadsden Works, Southern Steel Company, Birmingham. Works at Gadsden. Four basic furnaces; 2 basic building.—*See page 201.*

Tennessee Coal, Iron, and Railroad Company, Birmingham. Three open-hearth steel plants in Alabama. Fourteen completed, 4 building, and 2 projected basic furnaces.—*For a description of these works see pages 198-99.*

OHIO—17 COMPLETED, 2 BUILDING, AND 1 PARTLY ERECTED.

Alliance Works, American Steel Foundries, Chicago. Works at Alliance, Ohio. Four basic furnaces; steel castings.—*See page 126.*

Biesecker Steel Mills, The Imperial Steel Company, Cleveland. Works at Imperial Station. Building one basic furnace; steel castings.—*See page 360.*

Bucyrus (The) Steel Casting Company, Bucyrus. Two special basic furnaces; steel castings.—*See page 370.*

Byesville Works, The United Sheet and Tin Plate Company, Marietta. One partly erected basic furnace at Byesville.—*See page 185.*

Canton Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Canton. Three acid furnaces.—*See pages 163-64.*

Cleveland (The) Steel Casting Company, Cleveland. Two acid furnaces; steel castings.—*See page 361.*

Middletown Branch, The American Rolling Mill Company, Middletown. Two basic furnaces.—*See page 186.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Western Reserve Building, Cleveland. Six furnaces, (one acid and 5 basic.)—*See pages 44-45.*

Norwalk (The) Steel and Iron Company, (Incorporated,) Norwalk. Two modified basic furnaces.—*See page 373.*

Ohio (The) Steel Foundry Company, Lima. Two furnaces (one acid and one basic); steel castings.—*See pages 373-74.*

Ohio Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown. Building 12 basic furnaces.—*See pages 15-16.*

Otis (The) Steel Company, Limited, Cleveland. Eight furnaces, (3 acid and 5 basic.)—*See page 362.*

Portsmouth Steel Company, Wheeling, W. V. Works at Portsmouth, Ohio. Five furnaces, (one acid and 4 basic.)—*Page 368.*

Shull (The) Steel Castings and Manufacturing Company, Canton. One acid furnace; steel castings.—*See page 374.*

South Plant, The Buckeye Steel Castings Company, Columbus. Five basic furnaces; steel castings.—*See page 374.*

Steel (The) Foundry Company, Cincinnati. Two open-hearth furnaces (one acid and one basic); steel castings.—*See page 376.*

Steubenville Works, La Belle Iron Works, Steubenville. Ten basic furnaces.—*See pages 183-84.*

United (The) Steel Company, Canton. Three basic furnaces.—*See page 374.*

Wellman-Seaver-Morgan (The) Company, Cleveland. One basic furnace; steel castings.—*See page 187.*

Youngstown (The) Foundry and Machine Company, Youngstown. One acid furnace; steel castings.—*See page 358.*

INDIANA—6 COMPLETED AND 1 BUILDING.

Haskell and Barker Car Company, Michigan City. Six acid furnaces; malleable iron castings.—*See page 378.*

Indiana Harbor Works, American Steel Foundries, Chicago. Works at Indiana Harbor. Two acid furnaces; steel castings.—*Page 126.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana. Six completed and two projected basic furnaces.—*See pages 207-8.*

Indiana Steel Company, Chicago. Works at Gary. Building 28 basic furnaces; 28 basic furnaces are also projected.—*Page 30.*

Matthews Works, Armor Steel and Foundry Company, Chicago. Works at Matthews. One acid furnace; castings.—*Pages 379-80.*

National Car Coupler Company, Chicago. Works at Attica, Ind. One acid furnace; steel castings.—*See page 380.*

National Steel Casting Company, Montpelier. Two acid furnaces; steel castings.—*For a description of these works see page 381.*

ILLINOIS—9.

American Steel Foundries, Chicago. Two plants in Illinois which make steel castings only. Ten basic furnaces.—*See page 126.*

Bradley (David) Manufacturing Company, Bradley. One acid furnace for melting metal for malleable castings.—*Pages 383-84.*

Chicago Works, Grand Crossing Tack Company, Grand Crossing. Works at Chicago. Two basic furnaces.—*See pages 385-86.*

Commonwealth Steel Company, St. Louis. Works at Granite City. Four basic furnaces; steel castings.—*See pages 384-85.*

Granite City Steel Works Branch, National Enameling and Stamping Company, New York City. Works at Granite City, Illinois. Several basic furnaces.—*See page 218.*

Melrose Park Works, Latrobe Steel and Coupler Company. Works at Melrose Park, Ill. Two basic furnaces; castings.—*See page 387.*

Missouri Malleable Iron Company, East St. Louis. One basic furnace; malleable iron castings.—*See page 387.*

South Works, The Illinois Steel Company, Chicago. Works at South Chicago. One acid and 24 basic furnaces.—*See pages 27-28.*

MICHIGAN—3 COMPLETED AND 1 BUILDING.

Detroit (The) Steel Casting Company, Detroit. Two basic furnaces; steel castings.—*See page 392.*

Industrial Works, Bay City. Building one basic furnace; steel castings.—*See page 393.*

Monarch Steel Castings Company, Detroit. One acid furnace; steel castings.—*See page 393.*

Prescott (The) Company, Menominee. One basic furnace; steel castings. Another basic furnace may be built.—*See pages 393-94.*

WISCONSIN—4.

Bucyrus (The) Company, South Milwaukee. One basic furnace; steel castings. Another basic furnace is being built.—*Page 396.*

Dutcher (The) Company, Milwaukee. One acid furnace; steel castings.—*See pages 396-97.*

Falk (The) Company, Milwaukee. Two acid furnaces; steel castings.—*See page 397.*

National Brake and Electric Company, Milwaukee. One acid furnace; steel castings.—*For a description of these works see page 398.*

MINNESOTA—1.

Washburn (The) Steel Castings and Coupler Company, Minneapolis. One acid furnace; steel castings.—*See page 400.*

MISSOURI—1 COMPLETED AND 1 BUILDING.

St. Louis Steel Foundry, Curtis and Co. Manufacturing Company, St. Louis. Building 2 basic furnaces; steel castings.—*Page 401.*

Scullin-Gallagher Iron and Steel Company, St. Louis. Nine basic furnaces; steel castings.—*For description see pages 401-2.*

COLORADO—1.

Minnequa Rolling Mills and Steel Works, Colorado Fuel and Iron Company, Denver. Twelve basic furnaces at Pueblo.—*Page 227.*

WASHINGTON—1 BUILDING.

Cascade Steel Foundry Company, Seattle. Building one basic furnace at Earlington.—*For a description of these works see page 403.*

CALIFORNIA—2 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Doble (Abner) Company, San Francisco. Building two basic furnaces; steel castings.—*See page 406.*

Great Western Rolling Mills Company, Rodeo. Contemplates erecting open-hearth steel furnaces.—*See page 407.*

Pacific Jupiter Steel Company, San Francisco. Works at South San Francisco. One acid furnace; steel castings.—*See pages 406-7.*

Rudgear Steel Company, San Francisco. One basic furnace.—*Page 407.*

UNITED STATES.

Total number of open-hearth steel works in the United States in November, 1907: 159 completed, 13 building, 2 partly erected, and 7 projected. Number of furnaces in the completed works, 199 acid and 492 basic: total, 691. In addition 4 acid and 96 basic furnaces were being built or were partly erected.

Total in June, 1904: 135 completed, 5 building, 2 partly erected, and 17 projected. Number of furnaces in the completed works, 185 acid and 364 basic: total, 549.

CRUCIBLE STEEL WORKS.

A list of works which are equipped for the manufacture of crucible and other steel castings will be found beginning on page 439.

MASSACHUSETTS—5.

Eastern Steel Casting Company, South Boston. All kinds of crucible steel castings.—*See pages 232-33.*

Lundin Steel Casting Company, Boston. Works at Chelsea. Hard and soft crucible steel castings.—*See page 233.*

New England Steel Casting Company, Hyde Park. Steel castings.—*See page 234.*

Thomson-Houston Electric Company, Steel Foundry Department, West Lynn. Special castings.—*See page 234.*

Worcester Steel Foundry Company, Millbury. Small castings and electric rail bonds.—*For a description of these works see page 235.*

CONNECTICUT—2.

Collins (The) Company, Collinsville. Product consumed wholly by the company.—*See page 238.*

Farist (The) Steel Company, Bridgeport. Rolled and hammered steel.—*For a description of these works see page 238.*

NEW YORK—6 COMPLETED AND 2 BUILDING.

Buffalo Crucible Casting Company, Buffalo. Ingots and castings.—*See page 243.*

Burgess & Dickinson, Dunkirk. Building; will make ingots which will be hammered into rounds, squares, flats, etc.—*Page 244.*

Drew Steel Foundry, E. H. Drew, Carlton Place, Lockport. Steel castings.—*See page 244.*

Halcomb Steel Company, Syracuse. Hammered and rolled bars, sheets, and forgings.—*See pages 245-46.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. Steel castings.—*See page 246.*

Ludlum (The) Steel and Spring Company, Watervliet. Building; will make crucible steel.—*See page 246.*

Rippel (E. G.) Steel Foundry Company, Buffalo. Castings.—*Page 248.*

Sanderson Brothers Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Syracuse. Hammered and rolled crucible steel of every description.—*For description see page 165.*

NEW JERSEY—7.

Chrome Steel Works, Chrome; telegraph address, Carteret. Chrome steel plates, angles, bars, and castings.—*See page 252.*

- Crucible Steel Company of America, Pittsburgh. Two crucible steel works in New Jersey. Tool, die, spring, cutlery, cast, cold-rolled, drawn, and other forms.—*See pages 163 and 165-66.*
- Heller Brothers Company, Newark. Clay crucible steel, made into rasp, file, and high-grade tool steel.—*See pages 252-53.*
- Ludlum (The) Steel and Spring Company, Pompton. Crucible cast steel and railway car springs.—*See page 253.*
- Mahwah Works, American Brake Shoe and Foundry Company, Mahwah. Crucible cast-steel inserts.—*See page 123.*
- Riverside Steel Casting Company, Newark. Steel castings up to 1,000 pounds in weight.—*For description see page 255.*

PENNSYLVANIA—33 COMPLETED AND 1 PROJECTED.

- Adams Crucible Steel Works, Redington. Tool steel, castings, etc.—*Idle and for sale or lease. See page 261.*
- Bethlehem Steel Company, South Bethlehem. Crucible steel. Controlled by the Bethlehem Steel Corporation.—*See page 106.*
- Braeburn Steel Company, Braeburn. Bar and tool steel.—*Page 312.*
- Burns Uniform Steel and Metallic Works, Latrobe. Crucible steel ingots, tool steel, etc.—*Idle. See page 312.*
- Carpenter (The) Steel Company, Reading. Steel for tools, dies, cutlery, files, wire, etc.—*See pages 266-67.*
- Colonial Steel Company, Pittsburgh. Works at Colona. Crucible steel bars, sheets, plates, etc.—*See pages 304-5.*
- Crucible Steel Casting Company, Lansdowne. All kinds of crucible steel castings.—*See page 272.*
- Crucible Steel Company of America, Pittsburgh. Seven crucible steel works in Pennsylvania. All descriptions of hammered and rolled crucible steel.—*See pages 162-65.*
- Cyclops Steel Works, Titusville. Special tool steel.—*For a description of these works see page 313.*
- Damascus Crucible Steel Casting Company, New Brighton. Crucible steel castings.—*See page 305.*
- Damascus Tool Steel Company, Pittsburgh. Works at Carnegie. Steel bars and Damascus and nickel steel for tools, dies, etc.; also angles, ell bars, etc.—*See page 293.*
- Demmler Works, Firth-Sterling Steel Company, McKeesport. Works at Demmler. Fine crucible tool steel.—*See pages 172-73.*
- Hussey-Binns Shovel Company, Pittsburgh. Works at Charleroi. Crucible cast steel used by the company in making shovels, spades, and scoops.—*See pages 314-15.*
- Illingworth (The John) Steel Company, New York. Works at Frankford, Philadelphia. Hammered and rolled steel bars and sheets for tools, saws, knives, files, etc.—*See pages 257-58.*

- Jessop Steel Company, New York. Works at Washington, Pa. Sheet and saw steel.—*See page 315.*
- Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons Iron and Steel Works, Tacony, Philadelphia. Principally saw steel, engravers' plates, bar tool steel, etc.—*See page 125.*
- Keystone Steel Casting Company, Chester. Steel castings from 1 lb. to 1,000 lbs.—*See page 273.*
- Kidd Brothers and Burgher Steel Wire Company, Aliquippa. May make crucible steel.—*See pages 308-9.*
- Lebanon Steel Casting Company, Lebanon. Small steel castings.—*See page 283.*
- McInnes Steel Company, Limited, Corry. "McInnes" tool steel and air-hardening steel; also "Cello" steel.—*See page 316.*
- Midvale (The) Steel Company, Nicetown, Philadelphia. Makes crucible steel.—*See page 258.*
- National Transit Company, Oil City. Steel castings for the use of the company exclusively.—*See page 317.*
- Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. High-speed tool steel.—*See page 146.*
- Philadelphia Steel and Iron Works, Frankford, Philadelphia. Steel castings.—*Idle. See pages 258-59.*
- Pittsburgh Works, American Steel Foundries, Chicago. Works at Pittsburgh. Steel castings.—*See pages 126-27.*
- Standard Roller Bearing Company, Philadelphia. Crucible steel machinery castings for the company's use.—*See page 259.*
- Vulcan Crucible Steel Company, Aliquippa. High-grade tool steel.—*See page 308.*
- Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Make crucible steel.—*See page 301.*

WEST VIRGINIA—1.

- Baldwin (The) Steel Company, New York. Works at Charleston, W. Va. High-grade tool steel and steel forgings.—*Pages 330-31.*

TENNESSEE—1.

- Southern Steel Works, Chattanooga. High-speed tool steel, forgings, etc.—*Idle. For a description of these works see page 343.*

OHIO—3.

- Biesecker Steel Mills, The Imperial Steel Company, Cleveland. Works at Imperial Station. Nickel, chrome, and tungsten machinery steel and light steel castings.—*See page 360.*
- Christy (The) Steel Company, Akron. Castings for automobile and machine parts.—*See page 371.*
- Norwalk (The) Steel and Iron Company, (Incorporated,) Norwalk. Spring steel, plow steel, etc.—*See page 373.*

INDIANA—1.

Oliver Chilled Plow Works, South Bend. Entire product used by the works in the manufacture of plows.—*See page 381.*

ILLINOIS—5.

Bradley (David) Manufacturing Company, Bradley. Plowshares.—*See pages 383-84.*

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, New Jersey. Works at Chicago Heights, Ill. Cast-steel inserts for brake shoes.—*See page 123.*

Chicago Steel Foundry Company, Chicago. High-manganese and high-carbon steel castings.—*See page 384.*

Columbia Tool Steel Company, Chicago Heights. Rolled and hammered tool steel and crucible machinery steel.—*See page 384.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Mass. Works at Chicago. Saw plate and crucible sheet steel.—*For a description of these works see pages 388-89.*

MICHIGAN—4 COMPLETED AND 1 PROJECTED.

Adrian Steel Casting Company, Adrian. Steel castings.—*Page 392.*

Carroll (The) Foundry, Houghton. May make crucible steel castings.—*See page 392.*

Michigan Crucible Steel Castings Company, Detroit. Light steel castings.—*See page 393.*

New Process Steel Company, Marshall. Crucible and nickel-vanadium steel castings.—*See page 393.*

Reed Manufacturing Company, Kalamazoo. Castings.—*See page 394.*

WISCONSIN—10.

Bay View (The) Steel Casting Company, Milwaukee. Steel castings.—*See page 396.*

Crucible Steel Casting Company, Milwaukee. Machinery castings of all kinds.—*See page 396.*

Dutcher Company, Milwaukee.—*Crucible furnaces idle. Pages 396-97.*

Gerlinger Steel Casting Company, West Allis. Steel castings for automobiles and general machinery purposes.—*See page 397.*

Maynard Steel Foundry Company, Milwaukee. All kinds of small crucible steel castings.—*See page 397.*

National Brake and Electric Company, Milwaukee. Steel castings; specialties, crank shafts, magnet frames, etc.—*See page 398.*

Nortmann-Duffke Foundry Company, Layton Park, Milwaukee. Steel castings.—*See page 398.*

Oostburg Steel Foundry, Oostburg. Steel castings.—*See page 398.*

Prime (The) Steel Company, Milwaukee. Steel castings.—*Page 398.*

Smith (George H.) Steel Casting Company, Milwaukee. Steel castings.—*For a description of these works see pages 398-99.*

CALIFORNIA—1.

Pacific Jupiter Steel Company, San Francisco. Works at South San Francisco. Crucible steel castings.—*See pages 406-7.*

UNITED STATES.

Total number of plants in the United States in November, 1907, which were equipped for the manufacture of crucible steel: 79 completed, 2 building, and 2 projected.

Total in June, 1904: 57 completed; none building or projected.

STEEL CASTING WORKS.

A list of all works which are equipped for the manufacture of Bessemer, open-hearth, crucible, and "special" steel castings is given below.

MASSACHUSETTS—7 COMPLETED AND 1 PROJECTED.

Eastern Steel Casting Company, South Boston. All kinds of crucible steel castings.—*See pages 232-33.*

Lundin Steel Casting Company, Boston. Works at Chelsea. Crucible steel castings.—*See page 233.*

Massachusetts Steel Casting Company, Everett. Make acid open-hearth and Tropenas steel castings.—*See pages 233-34.*

New England Steel Casting Company, Hyde Park. Crucible steel castings.—*See page 234.*

Security Construction and Engineering Company, Brookline. May make basic open-hearth castings at South Boston.—*See page 235.*

Thomson-Houston Electric Company, Steel Foundry Department, West Lynn. Acid open-hearth and crucible castings.—*Page 234.*

Watertown Arsenal, Watertown. Tropenas steel castings.—*Page 235.*

Worcester Steel Foundry Company, Millbury. Crucible steel castings and electric rail bonds.—*For description see page 235.*

RHODE ISLAND—1.

Providence Steel Casting Company, Providence. Tropenas steel castings.—*For a description of these works see page 236.*

CONNECTICUT—3.

Collins (The) Company, Collinsville. Crucible steel castings, all consumed by the company.—*See page 238.*

Malleable Iron Fittings Company, Branford. Acid open-hearth and Tropenas steel castings.—*See page 238.*

National Steel Foundry Company, New Haven. Acid open-hearth steel castings.—*For a description of these works see page 110.*

NEW YORK—10.

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. Tropenas steel castings for ship work for the use of the United States Navy.—*See page 243.*

Buffalo Crucible Casting Company, Buffalo. Crucible steel castings.—*See page 243.*

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo. Acid open-hearth steel castings.—*See page 244.*

Drew Steel Foundry, E. H. Drew, Carlton Place, Lockport. Crucible steel castings.—*See page 244.*

Gould Coupler Company, Depew. Basic open-hearth steel castings.—*See page 245.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. Crucible, acid open-hearth, and Tropenas steel castings.—*See page 246.*

Lackawanna Steel Company, West Seneca. Bessemer and basic open-hearth castings for its own use.—*See pages 99-100.*

Milliken Steel Works, Milliken Brothers, (Incorporated,) 11 Broadway, New York. Works on Staten Island. Basic open-hearth steel castings for the use of the company.—*See pages 246-47.*

Niagara Forged Steel Company, Buffalo. Works at Depew. Basic open-hearth steel castings.—*See pages 247-48.*

Rippel (E. G.) Steel Foundry Company, Buffalo. Crucible steel castings.—*For a description of these works see page 248.*

NEW JERSEY—9.

American Steel Corporation, Oxford. Wills steel castings.—*Page 251.*
Atha Steel Casting Company, Newark. Special Bessemer and acid and basic open-hearth steel castings.—*See pages 251-52.*

Chrome Steel Works, Chrome; telegraph address, Carteret. Acid and basic open-hearth and crucible steel castings.—*See page 252.*

Mahwah Works, American Brake Shoe and Foundry Company, Mahwah. Crucible cast-steel inserts for brake shoes.—*Page 123.*

New Jersey (The) Steel Company, Rahway. Special Bessemer and acid open-hearth steel castings.—*See page 253.*

Reliance Steel Foundry Company, Delawanna. Acid open-hearth steel castings.—*See page 254.*

Riverside Steel Casting Company, Newark. Crucible steel castings.—*See page 255.*

Sims-Kent Works, William H. Baker, Dover. Small McHaffie steel castings.—*Idle and for sale or lease. See page 255.*

Taylor Iron and Steel Company, High Bridge. Hadfield-Taylor manganese, nickel, chrome, and other castings; also armor-piercing projectiles.—*See pages 255-56.*

- PENNSYLVANIA—58 COMPLETED, 1 BUILDING, 1 PROJECTED.
- Adams Crucible Steel Works, Redington. Crucible steel castings.—*Idle and for sale or lease. See page 261.*
- Allegheny Steel Company, Pittsburgh. Works at Brackenridge. Small basic open-hearth steel castings.—*See pages 291-92.*
- American Bridge Company, Pittsburgh. Two works in Pennsylvania. Acid and basic open-hearth castings.—*See pages 66-67 and 68.*
- American Duplex Steel Company, New York. Works at Bradford. Duplex steel castings.—*See pages 311-12.*
- American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Open-hearth castings.—*See page 160.*
- American Steel Foundries, Chicago. Four works in Pennsylvania. Open-hearth and crucible steel castings.—*See pages 126-27.*
- Bethlehem Steel Company, South Bethlehem. Open-hearth steel castings.—*See pages 105-7.*
- Birdsboro Steel Foundry and Machine Company, Birdsboro. Acid open-hearth steel castings.—*See page 266.*
- Cambria Steel Company, Philadelphia. Works at Johnstown. Open-hearth steel castings.—*See page 155.*
- Chambersburg Engineering Company, Chambersburg. Heavy acid open-hearth steel castings.—*See page 281.*
- Chester Steel Castings Company, Philadelphia. Works at Chester. Acid open-hearth and McHaffie steel castings.—*See page 272.*
- Chilled Roll Foundry Company Department, United Engineering and Foundry Company, Pittsburgh. Works at Vandergrift. Acid open-hearth steel castings.—*See page 177.*
- Crucible Steel Casting Company, Lansdowne. All kinds of crucible steel castings.—*See page 272.*
- Damascus Crucible Steel Casting Company, New Brighton. Crucible steel castings; may make open-hearth castings.—*See page 305.*
- Duquesne Steel Foundry Company, Pittsburgh. Works at Kendall Station. Acid open-hearth and Tropenas castings.—*Pages 293-94.*
- Federal Steel Foundry Company, Chester. Acid open-hearth steel castings.—*See page 273.*
- Fischer Foundry and Machine Works, George L. Fischer, Sr., Ford City. Side-blown Bessemer steel castings; will also make acid open-hearth steel castings.—*See page 313.*
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Acid open-hearth steel castings.—*See page 294.*
- Fort Pitt Malleable Iron Company, McKees Rocks. Miscellaneous open-hearth malleable castings but steel castings could be made.—*See page 294.*
- Fort Pitt Steel Casting Company, McKeesport. Modified Bessemer steel castings.—*See pages 294-95.*

- General Castings Company, Verona, (a suburb of Pittsburgh.) Acid open-hearth steel castings.—*See page 295.*
- Hanover Union Steel Casting Company, Incorporated, Hanover. Small steel castings by a special process.—*Idle. See page 282.*
- Heany Fire Proof Wire Company, York. Acid open-hearth castings.—*Idle. See page 282.*
- Homestead Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Munhall. Basic open-hearth steel castings for the use of the company.—*See pages 13-14 and 18.*
- Hydraulic Machine Company, Pittsburgh. Open-hearth steel castings.—*See pages 295-96.*
- Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown. Acid open-hearth steel castings.—*See page 33.*
- Keystone Driller Company, Incorporated, Beaver Falls. Building; will make modified Bessemer steel castings.—*See page 305.*
- Keystone Steel Casting Company, Chester. Crucible and McHaffie steel castings.—*See page 273.*
- Keystone Steel Foundry Company, Avonmore. Acid open-hearth castings; Fisher steel castings can also be made.—*See page 315.*
- Lebanon Steel Casting Company, Lebanon. Small crucible steel castings.—*See page 283.*
- Lukens Iron and Steel Company, Coatesville. Open-hearth steel castings for its own use.—*See page 140.*
- McConway (The) and Torley Company, Pittsburgh. Acid open-hearth car couplers and miscellaneous castings.—*See page 296.*
- Mesta Machine Company, Pittsburgh. Works at West Homestead. Acid open-hearth steel rolls and general castings; also machine-moulded gears.—*See pages 296-97.*
- Midvale (The) Steel Company, Nicetown, Philadelphia. Open-hearth and crucible steel castings.—*See page 258.*
- National Foundry Company, Erie. Acid open-hearth railroad and general machinery castings.—*See page 317.*
- National Transit Company, Oil City. Special Bessemer, crucible, and Schwartz castings for its own use exclusively.—*See page 317.*
- Penn Steel Casting and Machine Company, Chester. Acid open-hearth and Tropenas steel castings. Also makes cast-steel pipe.—*See pages 273-74.*
- Pennsylvania Malleable Company, Pittsburgh. Works at McKees Rocks. Acid open-hearth car couplers and miscellaneous castings.—*See page 298.*
- Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Acid open-hearth and crucible castings.—*See pages 145-47.*
- Philadelphia Steel and Iron Works, Frankford, Philadelphia. "Eisen" steel and crucible steel castings.—*Idle. See pages 258-59.*

- Phoenix (The) Iron Company, Philadelphia. Works at Phoenixville. Open-hearth steel castings.—*See page 132.*
- Pittsburgh Steel Foundry, Pittsburgh. Works at Glassport. Acid and basic open-hearth steel castings.—*See page 298.*
- Pottstown Works, Stanley G. Flagg & Co., Philadelphia. Works at Pottstown. Iron castings and pipe fittings but acid open-hearth steel castings could be made.—*See page 270.*
- Reading Steel Casting Company, Reading. Tropenas steel castings.—*See page 270.*
- Seaboard Steel Casting Company, Chester. Acid open-hearth steel castings.—*See page 274.*
- Sharon Foundry Company, Sharon. Works at Wheatland. Acid open-hearth steel castings.—*See pages 306-7.*
- Sharon Works, The National Malleable Castings Company, Cleveland. Works at Sharon, Pa. Acid and basic open-hearth steel castings.—*See page 176.*
- Solid Steel Casting Company, Chester. Works at Lamokin. Acid open-hearth steel castings.—*See page 274.*
- Standard Roller Bearing Company, Philadelphia. Crucible steel machinery castings for the use of the company.—*See page 259.*
- Standard (The) Steel Works Company, Philadelphia. Works at Burnham. Acid open-hearth steel castings.—*See page 289.*
- Sterling Steel Foundry Company, Pittsburgh. Works at Braddock. Acid open-hearth steel castings.—*See page 300.*
- Sweet's Steel Company, Williamsport. Works at Newberry. Basic open-hearth steel castings.—*See pages 278-79.*
- Union Steel Casting Company, Pittsburgh. Acid open-hearth steel castings.—*See page 300.*
- Velte Foundry and Machine Company, Pittsburgh. Modified Tropenas steel castings.—*See page 301.*
- Weimer Chain and Iron Company, Lebanon. May make top-blown Bessemer steel castings.—*See page 285.*
- Wharton, Jr., (William) & Co., Incorporated, Philadelphia. Tropenas steel castings.—*For a description of these works see page 259.*

DELAWARE—3 COMPLETED AND 1 PROJECTED.

- Baldt (The) Steel Company, New Castle. Acid open-hearth steel castings.—*See page 320.*
- Brylgon Steel Casting Company, New Castle. Bookwalter and manganese steel castings.—*See pages 320-21.*
- Diamond State Steel Works, Wilmington. Acid and basic open-hearth steel castings.—*Idle and for sale. See page 321.*
- Tropenas Steel Company, New Castle. May make Tropenas steel castings.—*For a description of these works see page 322.*

DISTRICT OF COLUMBIA—2.

Naval Gun Factory, United States Navy Yard, Washington. Tropenas steel castings for ordnance for the Navy.—*See page 324.*
Ordnance Works, Firth-Sterling Steel Company, McKeesport, Pa. Works at Giesboro Manor, D. C. Acid and basic open-hearth steel castings.—*For a description of these works see page 173.*

VIRGINIA—1.

Newport News Shipbuilding and Dry Dock Company, New York. Works at Newport News, Va. Tropenas steel castings.—*Page 329.*

WEST VIRGINIA—1.

West Virginia Malleable Iron Company, Point Pleasant. Malleable castings but can make steel castings.—*For description see page 333.*

TENNESSEE—1.

Southern Steel Works, Chattanooga. Tropenas castings.—*Page 343.*

ALABAMA—3.

Birmingham Steel and Iron Company, Birmingham. Basic open-hearth general machinery castings.—*See pages 351-52.*
Gadsden Works, Southern Steel Company, Birmingham. Works at Gadsden. Basic open-hearth steel castings.—*See pages 201-2.*
Tennessee Coal, Iron, and Railroad Company, Birmingham. Steel Casting Department at Ensley. Basic open-hearth car couplers, gears, rolls, and other steel castings.—*See page 198.*

OHIO—22 COMPLETED AND 1 PARTLY ERECTED.

Alliance Works, American Steel Foundries, Chicago. Works at Alliance. Basic open-hearth couplers and other castings.—*Page 126.*
Bellaire Steel Works, Carnegie Steel Company, Pittsburgh. Bessemer castings for the company's use.—*See pages 10-11 and 18.*
Biesecker Steel Mills, Imperial Steel Company, Cleveland. Works at Imperial Station. Crucible and open-hearth nickel, chrome, and tungsten machinery steel and light steel castings.—*Page 360.*
Bonney-Floyd Company, Columbus. Works at South Columbus. Side-blown converter steel castings.—*See page 370.*
Bucyrus (The) Steel Casting Company, Bucyrus. Special basic open-hearth steel castings.—*See page 370.*
Christy (The) Steel Company, Akron. Crucible castings.—*Page 371.*
Cleveland (The) Steel Casting Company, Cleveland. Acid open-hearth steel castings.—*See page 361.*
Lunkenheimer (The) Company, Cincinnati. Special steel castings. May make Tropenas castings.—*See pages 375-76.*
Marion (The) Steam Shovel Company, Marion. Robert-Bessemer steel castings, all consumed by the company.—*See page 372.*

- Menough (The) Foundry Company, Incorporated, Wellsville. Now makes gray iron castings; may make Adams steel castings; converter partly erected; work suspended.—*See page 376.*
- Middletown Branch, The American Rolling Mill Company, Middletown. Basic open-hearth castings for company's use.—*Pages 186-87.*
- Newburgh Steel Works, American Steel and Wire Company of New Jersey, Cleveland. Acid and basic open-hearth steel castings for the company's use.—*See pages 44-45 and 50.*
- Ohio (The) Steel Foundry Company, Lima. Acid and basic open-hearth steel castings.—*See pages 373-74.*
- Otis (The) Steel Company, Limited, Cleveland. Acid and basic open-hearth steel castings.—*See page 362.*
- Portsmouth Steel Company, Wheeling, W. Va. Works at Portsmouth, Ohio. Open-hearth steel castings.—*See page 368.*
- Shull (The) Steel Castings and Manufacturing Company, Canton. Acid open-hearth steel machine castings.—*See page 374.*
- South Plant, The Buckeye Steel Castings Company, Columbus. Basic open-hearth steel car couplers and railroad castings.—*Page 374.*
- Steel (The) Foundry Company, Cincinnati. Acid and basic open-hearth steel castings.—*See page 376.*
- Steubenville Works, La Belle Iron Works, Steubenville. Basic open-hearth steel general mill castings.—*See pages 183-84.*
- Sutton (C. E.) Company, Toledo. Tropenas castings.—*Page 362.*
- Wellman-Seaver-Morgan (The) Company, Cleveland. Basic open-hearth steel castings.—*See page 187.*
- West (The) Steel and Iron Casting Company, Cleveland. Small and medium sized Tropenas steel castings.—*See page 363.*
- Youngstown (The) Foundry and Machine Company, Youngstown. Acid open-hearth steel castings.—*See page 358.*

INDIANA—7.

- Haskell and Barker Car Company, Michigan City. Iron castings but acid open-hearth steel castings could be made.—*See page 378.*
- Indiana Harbor Works, American Steel Foundries, Chicago. Works at Indiana Harbor. Acid open-hearth steel castings.—*Page 126.*
- Matthews Works, Armor Steel and Foundry Company, Chicago. Works at Matthews. Acid open-hearth castings; also castings by the "Gebhard" process.—*Pages 379-80.*
- National Car Coupler Company, Chicago. Works at Attica, Ind. Acid open-hearth steel castings.—*See page 380.*
- National Steel Casting Company, Montpelier. Acid open-hearth steel castings.—*See page 381.*
- Oliver Chilled Plow Works, South Bend. Crucible castings, all consumed by the works.—*See page 381.*
- Whiteley Steel Company, Muncie. "Crown" steel castings.—*Page 382.*

ILLINOIS—13.

- American Steel Foundries, Chicago. Two works in Illinois. Basic open-hearth steel castings.—*See page 126.*
- Bradley (David) Manufacturing Company, Bradley. Crucible steel plowshares; also malleable castings.—*See pages 383-84.*
- Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, N. J. Works at Chicago Heights. Tropenas steel brake shoes, crucible cast-steel inserts, etc.—*See page 123.*
- Chicago Steel Foundry Company, Chicago. High-manganese and high-carbon crucible steel castings; also magnetic castings.—*Page 384.*
- Commonwealth Steel Company, St. Louis, Missouri. Works at Granite City, Ill. Basic open-hearth steel castings.—*See pages 384-85.*
- Crane Company, Chicago. Soft Zenzes steel castings.—*Page 385.*
- Illinois (The) Steel Company, Chicago. Two works in Illinois. Bessemer and open-hearth castings for company's use.—*Pages 26-29.*
- Link-Belt Company, Chicago. Zenzes steel castings for the exclusive use of the company.—*See pages 386-87.*
- Melrose Park Works, Latrobe Steel and Coupler Company, Philadelphia. Works at Melrose Park, Illinois. Basic open-hearth automatic car couplers and other steel castings.—*See page 387.*
- Missouri Malleable Iron Company, East St. Louis. Iron castings but basic open-hearth steel castings could be made.—*Page 387.*
- Otis Elevator Company, New York. Works at Chicago. Schwartz steel castings.—*For a description of these works see page 387.*

MICHIGAN—9 COMPLETED AND 1 BUILDING.

- Adrian Steel Casting Company, Adrian. Crucible castings.—*Page 392.*
- Carroll (The) Foundry, Houghton. Modified Tropenas steel castings; may make crucible steel castings.—*See page 392.*
- Detroit (The) Steel Casting Company, Detroit. Robert-Bessemer and basic open-hearth steel castings.—*See page 392.*
- Industrial Works, Bay City. Building; basic open-hearth steel castings for their own use.—*See page 393.*
- Michigan Crucible Steel Castings Company, Detroit. All kinds of crucible steel castings; specialty, automobile castings.—*Page 393.*
- Monarch Steel Castings Company, Detroit. Acid open-hearth steel couplers and coupler attachments.—*See page 393.*
- New Process Steel Company, Marshall. Crucible castings.—*Page 393.*
- Prescott (The) Company, Menominee. Basic open-hearth electrical and other castings.—*See pages 393-94.*
- Reed Manufacturing Company, Kalamazoo. Crucible steel castings for general machinery, automobiles, etc.—*See page 394.*
- Western Malleable Steel Company, Detroit. Malleable steel castings for pneumatic tools, automobiles, etc.—*See page 394.*

WISCONSIN—13.

- Bay View Steel Casting Company, Milwaukee. Crucible steel castings.—*See page 396.*
- Bucyrus (The) Company, South Milwaukee. Basic open-hearth steel castings for the company's use.—*See page 396.*
- Crucible Steel Casting Company, Milwaukee. Crucible steel machinery castings.—*See pages 396-97.*
- Dutcher (The) Company, Milwaukee. Acid open-hearth steel castings; also has idle crucible furnaces.—*See pages 396-97.*
- Falk Company, Milwaukee. Acid open-hearth castings.—*Page 397.*
- Gerlinger Steel Casting Company, West Allis. Crucible steel castings for automobiles, etc.—*See page 397.*
- Maynard Steel Foundry Company, Milwaukee. All kinds of small crucible steel castings.—*See page 397.*
- Milwaukee Steel Foundry Company, Milwaukee. Special converter steel castings.—*See page 397.*
- National Brake and Electric Company, Milwaukee. Crucible and acid open-hearth steel castings.—*See page 398.*
- Nortmann-Duffke Foundry Company, Layton Park, Milwaukee. Crucible steel castings.—*See page 398.*
- Oostburg Steel Foundry, Oostburg. Crucible castings.—*Page 398.*
- Prime Steel Company, Milwaukee. Crucible castings.—*Page 398.*
- Smith (George H.) Steel Casting Company, Milwaukee. Crucible and special converter steel castings.—*See pages 398-99.*

MINNESOTA—2.

- American Hoist and Derrick Company, St. Paul. Tropenas steel castings.—*See pages 399-400.*
- Washburn (The) Steel Castings and Coupler Company, Minneapolis. Acid open-hearth car couplers and other castings.—*See page 400.*

MISSOURI—2.

- St. Louis Steel Foundry, Curtis and Co. Manufacturing Company, Wellston P. O., St. Louis. Manganese, high-carbon, chrome, and soft castings of Bessemer and open-hearth steel.—*See page 401.*
- Scullin-Gallagher Iron and Steel Company, St. Louis. Basic open-hearth and special Bessemer steel castings.—*See pages 401-2.*

COLORADO—1.

- Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Bessemer and open-hearth steel castings for the company's use.—*See pages 226-28.*

WASHINGTON—1 BUILDING.

- Cascade Steel Foundry Company, Seattle. Building works at Earl-ington to make basic open-hearth steel castings.—*Page 403.*

OREGON—1 COMPLETED AND 1 PROJECTED.

Columbia Steel Company, Portland. Surface-blown converter castings. May erect a new steel-casting plant at Linnton.—*Page 405.*

CALIFORNIA—3 COMPLETED, 2 BUILDING, AND 2 PROJECTED.

Doble (Abner) Company, San Francisco. Building; basic open-hearth steel castings.—*See page 406.*

Great Western Rolling Mills Company, Rodeo. May make open-hearth steel castings.—*See page 407.*

Mare Island Navy Yard, Mare Island. Building; Tropenas steel castings for ship work for the United States Navy.—*Page 406.*

Noble Electric Company, San Francisco. May make at Heroult-on-the-Pitt steel castings by electricity direct from ore.—*Page 407.*

Pacific Jupiter Steel Company, San Francisco. Acid open-hearth and crucible steel castings.—*See pages 406-7.*

Potter, John A., Los Angeles. Special steel castings.—*Page 407.*

Union Iron Works Company, San Francisco. Works at Potrero. Tropenas steel castings for the company's use.—*See page 108.*

UNITED STATES.

Total number of plants in the United States in November, 1907, which were equipped for the manufacture of steel castings: 172 completed, 5 building, one partly erected, and 6 projected. Of the completed plants 43 can make Bessemer or modified Bessemer steel castings, 101 can make open-hearth steel castings, 45 can make crucible steel castings, and 10 can make special steel castings.

Total in June, 1904, which were equipped for the manufacture of steel castings: 119 completed, 5 building, and 9 projected. Of the completed plants 20 could make Bessemer or modified Bessemer steel castings, 84 could make open-hearth castings, 26 could make crucible castings, and 4 could make special steel castings.

IRON AND STEEL RAIL MILLS.

Works which are equipped for the manufacture of all kinds of iron and steel rails are included in this list.

NEW YORK—1.

Lackawanna Steel Company, West Seneca. Standard sections of steel rails; also 12 to 65-pound rails.—*For description see page 99.*

NEW JERSEY—1.

Tremley Point Plant, American McKenna Process Company, Milwaukee. Works at Tremley Point. Renewed steel rails.—*Page 124.*

PENNSYLVANIA—8.

- American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Light steel rails.—*See page 158.*
- Bethlehem Steel Company, South Bethlehem. Open-hearth, nickel-steel, and nickel-chrome steel rails.—*See pages 106-7.*
- Cambria Steel Company, Philadelphia. Works at Johnstown. Steel T rails from 8 to 100 pounds per yard.—*See page 155.*
- Carnegie Steel Company (of New Jersey), Pittsburgh. Two works in Pennsylvania which roll steel rails: Edgar Thomson Steel Works, Bessemer; light and heavy steel rails. McCutcheon Mill, Allegheny; 8, 10, and 12-pound rails rolled from short length "seconds" or ends from standard steel rails.—*See pages 12-13 and 15.*
- Clearfield Steel and Iron Company, Pittsburgh. Works at Hyde. Iron and steel rails.—*See page 313.*
- Hollidaysburg Iron and Nail Company, Hollidaysburg. Flat and small T rails.—*See page 288.*
- Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Standard sections of rails, street rails, etc.—*See page 145.*

MARYLAND—2.

- Cumberland Rolling Mill, Maryland Rail Company, lessee, Cumberland. Renewed light steel rails from 8 to 40 lbs.—*Page 323.*
- Maryland Steel Company, Sparrows Point, Maryland, and Girard Building, Philadelphia. Works at Sparrows Point. Standard sections of steel rails.—*For a description of these works see page 148.*

VIRGINIA—1.

- Loucks Iron and Steel Company, Incorporated, Roanoke. Rerolled T rails from 8 to 25 pounds to the yard.—*See page 328.*

WEST VIRGINIA—2.

- Fairmont Steel Company, Fairmont. Steel rails from 16 pounds to 30 pounds to the yard.—*See page 331.*
- West Virginia (The) Rail Company, Huntington. Steel rails from 12 pounds to 40 pounds to the yard.—*For description see page 333.*

TENNESSEE—1.

- Knoxville Iron Company, Knoxville. Works at Lonsdale. T rails from 12 to 30 lbs. per yard; also street rails.—*See pages 342-43.*

GEORGIA—1.

- Atlanta Steel Company, Atlanta. Light rails.—*See pages 344-45.*

ALABAMA—5.

- Republic Iron and Steel Company, Pittsburgh. Two works in Alabama which are equipped for the manufacture of rails: Alabama Works, Gate City; light T rails. Birmingham Mill, Birmingham; small T rails.—*See pages 94-95.*

Tennessee Coal, Iron, and Railroad Company, Birmingham. Two works in Alabama which are equipped for the manufacture of rails: Bessemer Rolling Mills, Bessemer; light rails. Steel Works Division, Ensley; basic open-hearth steel rails.—*See pages 198-99.* Weller Rolling Mill and Forge, Emery Steel Company, lessee, Birmingham. Works at Gadsden. Light T rails.—*See pages 352-53.*

OHIO—6.

Bessemer Plant, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown. Standard sections of rails.—*See page 94.* Cambridge Works, Interstate Iron and Steel Company, Chicago. Works at Cambridge. Light rails.—*See pages 208-9.* Columbus Iron Works, Standard Chain Company, Pittsburgh. Works at Columbus, Ohio. Light T rails.—*See page 182.* Lorain Works, The National Tube Company (of Ohio), Lorain. Girder rails.—*See page 32.* Newark Steel Plant, The Ohio Rail Company, Newark. Rerolled steel rails.—*See pages 372-73.* Ohio Steel Works, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown. Standard sections of steel rails.—*For a description of these works see pages 15-16.*

INDIANA—2 COMPLETED AND 1 BUILDING.

Indiana Steel Company, Chicago. Building works at Gary to make standard sections of basic open-hearth steel rails.—*See page 31.* Linton (The) Rolling Mill Company, Linton. Light steel rails from 12 lbs. to 40 lbs.—*See page 379.* Ohio Falls Iron Company, New Albany. Light rails.—*See page 381.*

ILLINOIS—5 COMPLETED AND 1 BUILDING.

Calumet Steel Company, Chicago. Building works at Chicago Heights which are being equipped for the manufacture of light rails from 8 lbs. to 20 lbs. per yard.—*See page 384.* Illinois (The) Steel Company, Chicago. Two works: Joliet Works, Joliet; standard sections. South Works, South Chicago; standard and light sections.—*See pages 26-28.* Joliet Plant, American McKenna Process Company, Milwaukee, Wisconsin. Works at Joliet, Illinois. Renewed steel rails by the McKenna process.—*See page 123.* Republic Iron and Steel Company, Pittsburgh. Two works: Sylvan Works, at Moline, and Tudor Works, at East St. Louis; T rails.—*For a description of these works see page 96.*

WISCONSIN—1.

Milwaukee Works, The Illinois Steel Company, Chicago. Works at Milwaukee. Light rails from 12 lbs. to 45 lbs. per yard.—*Page 27.*

MISSOURI—1.

Hirsch Rolling Mill Company, St. Louis. Light rails.—*See page 401.*

KANSAS—1.

Kansas City Plant, American McKenna Process Company, lessee, Milwaukee, Wisconsin. Works at Kansas City, Kansas. Renewed steel rails by the McKenna process.—*See page 123.*

COLORADO—2.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Standard sections of Bessemer and open-hearth rails; also mine rails.—*See pages 226-27.*
Western Rolling Mills Company, lessee, Denver. Eight, 12, 16, and 20-lb. T rails.—*For a description of these works see page 402.*

WASHINGTON—1.

Seattle Steel Company, Youngstown. Light T rails.—*See page 404.*

CALIFORNIA—1.

Judson Manufacturing Company, Emeryville. Light rails.—*Page 406.*

UNITED STATES.

Total number of iron and steel rail mills in the United States in November, 1907: 42 completed and 2 building.

Total in June, 1904: 44 completed, one building, and one projected.

IRON AND STEEL STRUCTURAL MILLS.

A complete list of all rolling mills which are equipped for the manufacture of beams, girders, tees, angles, channels, and other forms of structural shapes is given below. Works which manufacture bridge rods, bridge plates, building rods, eyebars, structural tubing, etc., are also included.

MASSACHUSETTS—1.

Kinsley Iron and Machine Company, Canton. Building rods, etc.—*For a description of these works see page 233.*

NEW YORK—5.

Albany Iron and Steel Works Department, The Rail Joint Company, New York. Works at Troy. Special angles for steam and electric railway work.—*See page 116.*

Buffalo Steel Company, Tonawanda. Bessemer steel angles, channels, tees, and special shapes for agricultural implements and other purposes.—*See pages 243-44.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Structural shapes, etc.—*See page 99.*

Milliken Steel Works, Milliken Brothers, (Incorporated,) New York. Works on Staten Island. Beams, channels, etc.; also build bridges, etc.—*See pages 246-47.*

Standard Rolling Mill, M. J. Dempsey, New York City. Iron angles, etc.—*For a description of these works see pages 248-49.*

NEW JERSEY—3.

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton. Iron angles.—*See page 252.*

Chrome Steel Works, Chrome; telegraph address, Carteret. Chrome steel plates, angles, (3, 4, 6, and 8-inch,) etc.—*See page 252.*

Passaic Steel Company, Paterson. Beams, channels, angles, universal plates, etc; also builds bridges, etc.—*See page 254.*

PENNSYLVANIA—30.

American Bridge Company, Pittsburgh. One structural plant at Pencoyd and two eyebar plants, one at Ambridge and one at Athens. At Pencoyd the company makes open-hearth steel channel bars, beams, deck beams, tees, angles, flats, rounds, and bar and bridge steel; the works also have a bridge and construction department which is equipped for making all classes of bridge and architectural work. At Ambridge the company makes solid steel forged eyebars from 2 to 16 inches wide and at Athens it makes similar eyebars from 2 to 10 inches wide.—*See pages 66-68.*

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Steel structural shapes. Operate shops equipped with machinery for fabricating all kinds of structural material, especially for "steel skeleton buildings."—*See pages 158-59.*

Bethlehem Steel Company, South Bethlehem. Steel beams, tees, angles, etc.; also special wide-flanged rolled beams.—*Pages 105-7.*

Brandywine Rolling Mills, Worth Brothers Company, Coatesville. Steel plates for tank and structural work.—*See pages 141-42.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Steel beams, girders, angles, columns, roof trusses, and other fitted structural work.—*See page 155.*

Carnegie Steel Company (of New Jersey), Pittsburgh. Six mills in Pennsylvania which are equipped for the manufacture of beams, angles, girders, channels, and other structural shapes; also fitted structural work.—*See pages 11-17.*

Central Iron and Steel Company, Harrisburg. Universal bridge, ship, and structural plates.—*See page 150.*

Damascus Tool Steel Company, Pittsburgh. Works at Carnegie. Steel angles, ell bars, etc.—*See page 293.*

- Danville Structural Tubing Company, (a copartnership,) Danville. Structural tubing, covered by patents, consisting of round unwelded tubing from $\frac{1}{4}$ -inch to 2 inches in diameter; also shapes for agricultural implements, bedsteads, etc.—*See page 276.*
- Davis Brothers, Philadelphia. Small even leg angles.—*See page 257.*
- Eastern (The) Steel Company, Pottsville. Steel beams, channels, angles, tees, etc.; also operates a bridge shop.—*See page 268.*
- Franklin (The) Rolling Mill and Foundry Company, Edward E. Hughes, Receiver, Franklin. "U" shapes for the manufacture of tripartite steel poles.—*See pages 313-14.*
- Glasgow Iron Company, Pottstown. Two works at Pottstown: Glasgow Iron and Steel Works; iron and steel bridge plates, etc. Pottstown Iron Works; bridge plates, etc.—*See pages 133-34.*
- Hollidaysburg Iron and Nail Company, Hollidaysburg. Channel iron.—*See page 288.*
- Logan Iron and Steel Company, Burnham; Philadelphia offices, North American Building. Bridge iron, angles, etc.—*Pages 288-89.*
- Lukens Iron and Steel Company, Coatesville. Open-hearth steel ship, bridge, and tank plates.—*See page 139.*
- Montour Rolling Mills Department, Reading Iron Company, Reading. Works at Danville. Angle iron and iron and steel angle bars.—*See page 135.*
- Penn Iron Company, Limited, Lancaster. Iron for bridge work, etc.—*See page 284.*
- Pennsylvania Brake Beam Company, lessee, Danville. Special shapes for brake beams, deck and I beams, etc.—*See page 278.*
- Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Bessemer and open-hearth angles, I beams, channels, etc. Construction department erects iron and steel bridges and buildings.—*See pages 145-46.*
- Phoenix (The) Iron Company, Philadelphia. Works at Phoenixville. Open-hearth steel beams, channels, angles, tees, and miscellaneous structural shapes. Construction department erects iron and steel buildings and bridges. An eyebar plant, making bars from 3 inches to 16 inches inclusive in width, is connected with the works; also a hydraulic testing machine.—*See page 132.*
- Reading Works, American Iron and Steel Manufacturing Company, Lebanon. Works at Reading. Rods, plates, straps, and forgings for cars, bridges, buildings, etc.—*See page 137.*
- Slatington Rolling Mill Company, Slatington. Angle iron, etc.—*See page 262.*
- Vulcan Forge and Iron Works, Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks. Bridge iron and angle iron and steel.—*For a description of these works see page 301.*

DELAWARE—2.

Diamond State Steel Works, Wilmington. Two mills. Bridge rods.
—*Idle and for sale. For a description of these works see page 321.*

VIRGINIA—2.

Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle, Richmond. Bridge iron.—*See page 329.*

Tredegar Iron Works, The Tredegar Company, Richmond. Bridge iron.—*For a description of these works see pages 329-30.*

KENTUCKY—1.

Licking Coal and Iron Company, Incorporated, Covington. Angle, tee, jail, and sash iron.—*For description see pages 336-37.*

TENNESSEE—1.

Knoxville Iron Company, Knoxville. Works at Lonsdale. Light sections of angle and channel iron.—*See pages 342-43.*

ALABAMA—3.

Eclipse Rolling Mill, East Birmingham. Bedstead iron, angles, etc.
—*Idle and for sale or lease. See page 352.*

Republic Iron and Steel Company, Pittsburgh. Two mills in Alabama which make angles and light channels.—*See pages 94-95.*

OHIO—8.

Cambridge Works, Interstate Iron and Steel Company, Chicago. Works at Cambridge. Bessemer steel angles, U bars, channel flats, etc.—*See pages 208-9.*

Carnegie Steel Company (of New Jersey), Pittsburgh. Two mills at Youngstown, Ohio, which make channels, angles, and other shapes.—*See pages 14 and 17.*

Elyria (The) Iron and Steel Company, Elyria. Steel tubing for bedstead, structural, agricultural implement purposes, and agricultural implement shapes.—*See page 361.*

Middletown Branch, The American Rolling Mill Company, Middletown. Sheet steel building materials of all kinds.—*See page 186.*

Republic Iron and Steel Company, Pittsburgh. Two mills at Youngstown, Ohio, which make angles.—*See page 95.*

Union (The) Rolling Mill Company, Cleveland. Works and offices at Newburgh, in the city of Cleveland. Bridge iron.—*See page 363.*

INDIANA—2 COMPLETED AND 1 BUILDING.

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor. Angles, I beams, channels, etc.—*Pages 207-8.*

Indiana Steel Company, Chicago. Building works at Gary, Ind., for the manufacture of structural shapes.—*See page 31.*

Ohio Falls Iron Company, New Albany. Angles, bar iron for bridge work, etc.; specialties, wide flats up to 12 inches and iron square root angles for safe works.—*For description see page 381.*

ILLINOIS—4 COMPLETED AND 2 BUILDING.

Calumet Steel Company, Chicago. Building works at Chicago Heights. Will make Bessemer steel angles, channels, tees, etc.—*See page 384.*

Chicago Heights Works, Inland Steel Company, Chicago. Works at Chicago Heights. Angles, tees, channels, etc.—*See page 207.*

Deering Works Rolling Mill, Wisconsin Steel Company, Chicago. Angles, channels, etc.—*See page 211.*

Illinois (The) Steel Company, Chicago. Two works in Illinois which are equipped for the manufacture of angles, beams, channels, and other structural shapes; also bridges, iron and steel buildings, etc.—*See pages 26-29.*

Joliet Iron Products Company, Joliet. Building; will make angles and shapes.—*For a description of these works see page 386.*

WISCONSIN—1.

Superior Branch, United States Cast Iron Pipe and Foundry Company, New York City. Works at Superior, Wisconsin. Steel structural shapes.—*Idle and for sale or lease. See page 399.*

MISSOURI—1.

Hirsch Rolling Mill Company, St. Louis. Iron and steel angles, shapes, etc.—*For a description of these works see page 401.*

COLORADO—1.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Iron and steel structural and other shapes.—*For description see pages 226-27.*

CALIFORNIA—3.

Judson Manufacturing Company, Emeryville; offices and sales-rooms, San Francisco. Structural and agricultural shapes.—*See page 406.*

Rudgear Steel Company, cor. Bay and Stockton sts., San Francisco. Steel angles, etc.—*See page 407.*

Southern Pacific Company, Sacramento. I beams, angle iron, etc.—*For a description of these works see page 407.*

UNITED STATES.

Total number of works in the United States in November, 1907, which were equipped to roll iron or steel structural shapes, bridge rods, etc.: 68 completed and 3 building.

Total in June, 1904: 70 completed, one building, and 2 projected.

IRON AND STEEL WIRE-ROD MILLS.

A complete list of the mills which are equipped to roll iron and steel wire rods is given below. Some of the mills also roll copper rods.

MASSACHUSETTS—1.

South Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Worcester, Mass.—*See page 46.*

RHODE ISLAND—2.

Washburn Wire Company, Phillipsdale. Two works which roll rods, one at Phillipsdale and one at Auburn.—*See pages 236-37.*

CONNECTICUT—1.

National (The) Wire Corporation, New Haven.—*See pages 110-11.*

NEW YORK—1.

Wickwire Brothers, Cortland.—*For description see page 249.*

NEW JERSEY—3.

Atha Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Harrison, New Jersey. Wire rods in coils.—*See pages 163 and 166.*

Roebbling's (John A.) Sons Company, Trenton. Two rod mills, one at Trenton and one at Roebbling; the rod mill at Trenton is to be removed to Roebbling.—*For description see pages 121-22.*

PENNSYLVANIA—10 COMPLETED AND 1 PROJECTED.

American Steel and Wire Company of New Jersey, Cleveland. Five works in Pennsylvania which roll wire rods.—*See pages 43-46.*

Carpenter (The) Steel Company, Reading. Steel wire rods.—*See pages 266-67.*

Duplex Metals Company, New York City. Works at Chester. Rods for treatment by the Monnot process.—*See pages 272-73.*

Kidd Brothers and Burgher Steel Wire Company, Aliquippa. May make wire rods.—*See pages 308-9.*

Milesburg Iron Works, The McCoy-Linn Iron Company, lessee, Milesburg. Soft iron wire rods.—*See page 289.*

Monessen Plant, Page Woven Wire Fence Company, Monessen.—*See page 316.*

Monessen Works, Pittsburgh Steel Company, Pittsburgh. Works at Monessen.—*For a description of these works see pages 168-69.*

KENTUCKY—1.

Ashland Steel Company, Incorporated, Ashland.—*See page 336.*

GEORGIA—1.

Atlanta Steel Company, Atlanta.—*For description see pages 344-45.*

ALABAMA—1.

Ensley Works, Southern Steel Company, Birmingham. Works at Ensley.—*For a description of these works see page 201.*

OHIO—5.

American Steel and Wire Company of New Jersey, Cleveland. Four works at Cleveland which roll wire rods.—*See pages 43-45.*

Struthers Plant, Morgan Spring Company, Worcester, Mass. Works at Struthers, Ohio.—*For description see pages 357-58.*

INDIANA—2.

Anderson Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Anderson, Indiana.—*See pages 43-44.*

Kokomo Steel and Wire Company, Kokomo.—*See page 379.*

ILLINOIS—4.

Dillon-Griswold Wire Company, Sterling.—*Rod mill idle. Page 385.*
Grand Crossing Works, Grand Crossing Tack Company, Grand Crossing.—*See pages 385-86.*

Joliet Works, The Illinois Steel Company, Chicago.—*See pages 26-27.*

Waukegan Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Waukegan.—*See page 46.*

COLORADO—1.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo.—*See pages 226-27.*

UNITED STATES.

Total number of iron and steel wire-rod plants in the United States in November, 1907: 33 completed and one projected.

Total number of iron and steel wire-rod mills in the United States in June, 1904: 33 completed plants. None building.

IRON AND STEEL SKELP MILLS.

A complete list of mills which are equipped to roll iron and steel skelp is given below. Some of the mills also roll plates and sheets.

NEW YORK—1.

Cohoes Rolling Mill Company, Cohoes. Skelp iron.—*For a description of these works see page 244.*

NEW JERSEY—1.

West Jersey Tube Works, Philadelphia. Works at Bridgeton, New Jersey. Skelp iron.—*Idle. For description see page 256.*

PENNSYLVANIA—43.

Allegheny Steel Company, Pittsburgh. Works at Brackenridge. Steel skelp.—*See pages 291-92.*

Birdsboro Nail Works, The E. and G. Brooke Iron Company, Birdsboro. Skelp iron, etc.—*See page 266.*

Blandon Rolling Mill, Estate of Simon Seyfert, Blandon. Grooved pipe skelp.—*See page 266.*

Byers (A. M.) Company, Pittsburgh. Two works in Pennsylvania which roll skelp iron, all consumed by the company.—*Page 170.*

Carnegie Steel Company (of New Jersey), Pittsburgh. Four mills in Pennsylvania which roll skelp.—*See pages 11 and 16.*

Carnegie Tube Company, Carnegie. Skelp iron.—*Idle and for sale. —See page 292.*

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken. Flue iron.—*See page 267.*

Etna Iron and Tube Works, Spang, Chalfant & Co., Incorporated, Pittsburgh. Works at Etna. Pipe iron.—*See page 294.*

Gibraltar Iron Works, Estate of Simon Seyfert, Reading. Boiler tube and pipe iron.—*See page 268.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Skelp steel.—*See page 282.*

Harrisburg Rolling Mill Company, Harrisburg. Skelp iron.—*See page 282.*

Hollidaysburg Iron and Nail Company, Hollidaysburg. Skelp iron.—*See page 288.*

Hughes & Patterson, Philadelphia. Skelp iron.—*See page 257.*

Juniata Rolling Mill, The Eleanor Iron Company, Hollidaysburg. Grooved skelp iron.—*See page 288.*

Lebanon Iron and Steel Company, Lebanon. Skelp iron.—*Page 283.*

Logan Iron and Steel Company, Burnham. Skelp.—*See pages 288-89.*

Longmead Iron Company, Conshohocken. Grooved skelp iron.—*See page 269.*

National Tube Company, Pittsburgh. Four mills in Allegheny county which roll skelp.—*See pages 37-38.*

Parkesburg (The) Iron Company, Parkesburg. Boiler-tube skelp iron.—*See page 273.*

Pottsgrove Iron Works, Potts Brothers Iron Company, Limited, Pottstown. Pipe and flue iron.—*See page 270.*

Reading Iron Company, Reading. Four mills in Pennsylvania which roll skelp iron.—*See page 135.*

- Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading. Works at Seyfert Station. Iron boiler-tube skelp, pipe skelp, etc.—*Plate or skelp mill idle; puddling department active. See page 271.*
- Shoenberger Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Pittsburgh. Steel skelp.—*See page 45.*
- Susquehanna Iron Company, Columbia. Three mills in Pennsylvania which roll skelp iron.—*See pages 151-52.*
- Tidewater Steel Company, Chester. Works at Thurlow Station. Steel skelp, etc.—*Idle and for sale or lease. See pages 274-75.*
- Tyler (The) Tube and Pipe Company, Washington. Charcoal skelp iron, used by the company.—*See page 318.*
- Tyrone Forges, The Tyrone Iron Company, Harrisburg. Works at Tyrone Forges. Sheared and grooved rolled iron and steel skelp; specialty, knobbled charcoal iron boiler-tube skelp.—*See pages 289-90.*
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg. Skelp iron and steel.—*See page 301.*
- Viaduct Iron Works, Worth Brothers Company, Coatesville. Boiler-tube skelp. (Operated by the Coatesville Rolling Mill Company.)—*See page 142.*
- Vulcan Charcoal Iron and Steel Company, Crum Lynne. Works at Eddystone Station. Skelp iron for boiler tubes.—*See page 276.*
- West End Iron Company, Lebanon. Skelp iron.—*See page 284.*

WEST VIRGINIA—4.

- Riverside Works, Skelp Mills, National Tube Company, Pittsburgh. Works at Benwood, West Virginia. Steel skelp.—*See page 38.*
- Wheeling Steel and Iron Company, Wheeling. Two works in West Virginia which roll skelp.—*See page 190.*
- Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, West Virginia. Steel skelp, etc.—*See page 184.*

ALABAMA—1.

- Alabama Tube and Iron Works, Helena. Skelp iron.—*Idle and for sale. For a description of these works see pages 350-51.*

OHIO—6.

- Dover Rolling Mill, The Dover Forge and Iron Company, Canal Dover. Charcoal iron skelp.—*See pages 371-72.*
- Lorain Works, The National Tube Company (of Ohio), Lorain. Steel skelp.—*See page 32.*
- Steubenville Works, La Belle Iron Works, Steubenville. Steel skelp, etc.—*See pages 183-84.*
- United (The) Steel Company, Canton. Steel skelp.—*See page 374.*
- Upper Union Mill, Carnegie Steel Company (of New Jersey), Pittsburgh. Works at Youngstown, Ohio. Skelp, etc.—*See page 17.*

Youngstown (The) Sheet and Tube Company, Youngstown. Skelp iron and steel.—*For a description of these works see pages 180-81.*

ILLINOIS—1.

Western Tube Company, Kewanee. Skelp used by the company in making pipe.—*For a description of these works see page 389.*

UNITED STATES.

Total number of iron or steel skelp plants in the United States in November, 1907: 57 completed. None building.

Total number in June, 1904: 61 completed and 2 projected.

IRON AND STEEL PLATE AND SHEET MILLS.

Mills which are equipped for making boiler plates, ship plates, nail plates, tack plates, shovel plates, tie plates, etc., are included in this list. Works which make forged armor plates are also included. A number of the works named below make a specialty of rolling iron plates and sheets, although they occasionally roll steel plates and sheets from purchased billets. Works making iron or steel black plates for tinning are not included unless plates or sheets other than black plates for tinning are made. A list of works which are equipped for the manufacture of iron or steel black plates or sheets for tinning will be found beginning on page 468.

MASSACHUSETTS—2.

Stanley (The) Works, Bridgewater. Bessemer and open-hearth tack plate.—*See page 234.*

Tremont Nail Company, West Wareham. "Percha" plates for nails and tacks.—*For a description of these works see pages 234-35.*

CONNECTICUT—1.

American (The) Tube and Stamping Company, Bridgeport. Plate and sheet steel.—*For a description of these works see pages 237-38.*

NEW YORK—5.

Elmira Steel Works, Lucknow Iron and Steel Company, lessee, Harrisburg, Pa. Works at Elmira, New York. Universal steel plates from 6 to 30 inches wide and of any thickness.—*See pages 114-15.*

Holcomb Steel Company, Syracuse. Hammered and rolled steel sheets.—*See pages 245-46.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Universal plates up to 48 inches wide and shear plates up to 72 inches wide.—*See page 100.*

Sanderson Brothers Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Syracuse, New York. Hammered and rolled crucible sheet steel, etc.—*For description see page 165.*

Seneca Iron and Steel Company, Buffalo. All kinds of black and galvanized sheet iron.—*For description see page 248.*

NEW JERSEY—2.

Chrome Steel Works, Chrome; telegraph address, Carteret. Chrome-steel plates, etc.—*See page 252.*

Passaic Steel Company, Paterson. Universal mill plates.—*Page 254.*

PENNSYLVANIA—80.

Allegheny Steel Company, Pittsburgh. Works at Brackenridge. Tank and boiler steel, sheet steel, etc.—*See pages 291-92.*

American Sheet and Tin Plate Company, Pittsburgh. Ten mills in Pennsylvania; plates and sheets.—*See pages 58-62.*

Bethlehem Steel Company, South Bethlehem. Forged armor plates.—*See page 106.*

Birdsboro Nail Works, The E. and G. Brooke Iron Company, Birdsboro. Nail plate.—*See page 266.*

Cambria Steel Company, Philadelphia. Two works at Johnstown which roll steel plates.—*See page 155.*

Canonsburg Steel and Iron Works, Canonsburg. Steel and iron sheets for stamping, enameling, deep drawing, tinning, galvanizing, etc.—*See pages 312-13.*

Carbon Steel Company, Pittsburgh. Open-hearth universal and sheared plates, 5-ply Carbon-chrome safe plates, etc.—*Page 292.*

Carnegie Steel Company, Pittsburgh. Four mills in Pennsylvania; steel boiler, sheared, ship, tank, universal, and other plates; also forged steel armor plates.—*See pages 13, 14, 16, and 17.*

Central Expanded Metal Company, Chess Brothers, Pittsburgh. Works at Rankin Station. Light steel plates for nails, straps, tacks, and stamping and die work.—*Idle. See pages 292-93.*

Central Iron and Steel Company, Harrisburg. Two mills at Harrisburg; boiler plate, marine and locomotive steel, ship plates, universal bridge and structural plates, tank steel, and other iron and steel plates.—*See page 150.*

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) lessees, Harrisburg. Iron and steel nail plate.—*See page 281.*

Colonial Steel Company, Pittsburgh. Works at Colona. Crucible and open-hearth sheets, plates, saw plates, etc.—*See pages 304-5.*

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken. All kinds of sheet, flue, and plate iron; corrugated iron a specialty.—*For a description of these works see page 267.*

- Crucible Steel Company of America, Pittsburgh. Five mills in Pennsylvania; crucible and open-hearth steel sheets and plates for boilers, hulls of vessels, etc.; also plow, saw, sheet, and plate steel, etc.—*See pages 162-65.*
- Duncannon (The) Iron Company, Duncannon; offices, 122 Race st., Philadelphia. Iron and steel nail plate.—*See page 276.*
- Duplex Metals Company, New York. Works at Chester, Pa. Copper-clad steel, bronze steel, aluminum steel, and silver steel in plates, sheets, etc., made by the Monnot process.—*Pages 272-73.*
- Gibraltar Iron Works, Estate of Simon Seyfert, Reading. Boiler plate and boiler tube and pipe iron.—*See page 268.*
- Glasgow Iron Company, Pottstown. Two works at Pottstown; iron and steel bridge, ship, tank, and boiler plate, flanged and dished boiler heads, manholes, manhole saddles for boilers, buckle plates, etc.—*See pages 133-34.*
- Glendale Mill, Lucknow Iron and Steel Company, lessee, Harrisburg. Works at Pine Iron Works. Iron and steel plates.—*See page 115.*
- Glendon Rolling Mill, Dilworth, Porter & Co., Limited, Pittsburgh. Tie plates, floor plates, etc.—*See page 295.*
- Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg. Iron and steel nail plate.—*See page 288.*
- Hubbard & Co., Pittsburgh. Works at Waynesburg. Shovel steel.—*See page 314.*
- Hussey-Binns Shovel Company, Pittsburgh. Works at Charleroi. Shovel plate, etc., all used by the company.—*See pages 314-15.*
- Illingworth (The John) Steel Company, New York. Works at Frankford, Philadelphia. Hammered and rolled steel sheets for tools, saws, knives, files, etc.—*See pages 257-58.*
- Interstate Steel Company, Brackenridge. Sheets for electric work, stoves, stamping, plating, and nickeling, hardware, shovels, and tack plate.—*See page 296.*
- Jessop Steel Company, 91 John st., New York. Works at Washington, Pa. Crucible sheet and saw steel.—*See page 315.*
- Jones and Laughlin Steel Company, Pittsburgh. Two works in Pennsylvania; plates and sheets.—*See pages 158-59.*
- Keystone Nail Works, George B. Lessig Company, Inc., Pottstown. Iron and steel shovel, tack, and nail plate.—*See page 269.*
- Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons Iron and Steel Works, Tacony, Philadelphia. Principally saw steel of every description, engravers' plates, etc.—*See page 125.*
- Lalanc and Grosjean Manufacturing Company, Harrisburg; main offices, 19 Cliff st., New York. Sheet steel.—*See page 283.*
- Lebanon Iron and Steel Company, Lebanon. Boiler plates, sheets, etc.—*See page 283.*

- Lukens Iron and Steel Company, Coatesville. All kinds of acid and basic open-hearth steel boiler, ship, bridge, and tank plates; also universal plates; also machine-flanged and dished boiler heads and patent hydraulic pressed boiler braces.—*Pages 139-40.*
- Meyersdale Sheet Steel Works, Meyersdale. Light steel sheets and range plates.—*For sale. See page 316.*
- Midvale (The) Steel Company, Nicetown, Philadelphia. Forged armor plates.—*See page 258.*
- Milton Nail Works, F. A. Godcharles Company, Milton. Iron and steel nail plate.—*See page 277.*
- Myers (The H. M.) Company Plant, Ames Shovel and Tool Company, Boston. Works at Beaver Falls, Pa. Rolled shovel blanks, all consumed by the company.—*See page 178.*
- New Castle Forge and Bolt Company, New Castle. Light plates for the use of the company.—*See page 306.*
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. Iron and steel nail plate.—*See pages 277-78.*
- Pencoyd Iron Works, American Bridge Company, Pittsburgh. Works at Pencoyd. Steel plates.—*See page 66.*
- Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Tie plates, splice plates, etc.—*See page 146.*
- Pottsgrove Iron Works, Potts Brothers Iron Company, Limited, Pottstown. Boiler plate and tank, flue, and pipe iron. Specialties, pipe and flue iron.—*See page 270.*
- Reading Iron Company, Reading. Two works in Pennsylvania which roll plate iron, tie plates, etc.—*See page 135.*
- Russell (J. C.) Shovel Company, Pittsburgh. Works at Aliquippa. Shovel blanks, all consumed by the company.—*See page 306.*
- Sable Iron Works, Zug Iron and Steel Company, Pittsburgh. Steel and iron sheets for corrugating, galvanizing, stamping, expanded metal, and electric work. Corrugated sheets are also made.—*See pages 299-300.*
- Shoenberger Works, American Steel and Wire Company of New Jersey, Cleveland. Works at Pittsburgh. Basic open-hearth steel plates, sheet steel, etc.—*See page 45.*
- Sligo Iron and Steel Company, Connellsville. Iron and steel sheets from No. 9 to No. 18 gauge and iron and steel plates No. 8 gauge and heavier; also wrought-steel floor plates.—*See pages 317-18.*
- Tidewater Steel Company, Chester. Works at Thurlow Station. Fire-box, boiler, ship, and tank plates.—*Idle. Pages 274-75.*
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Inc., Sharpsburg. Boiler, sheet, and tank iron and steel.—*See page 301.*
- Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Sheet iron and steel.—*See page 319.*

West Leechburg Steel Company, Pittsburgh. Works at West Leechburg. Hot and cold rolled strip steel for blanking, stamping, and drawing.—*See page 319.*

Wilkes Rolling Mill Company, Sharon. Iron and steel sheets.—*See page 308.*

Williamsport Iron and Nail Company, Williamsport. Iron and steel nail plate.—*See page 279.*

Wood (Alan) Iron and Steel Company, Philadelphia. Two works in Pennsylvania; universal plates and sheet, plate, and flue iron and steel.—*See pages 130-31.*

Worth Brothers Company, Coatesville. Three works at Coatesville; sheared steel plates for all purposes, including locomotive fire-box, locomotive boiler, marine boiler, stationary boiler, tank, and structural work, all sizes of machine flanged and dished heads, machine flanged manholes, saddles, etc; also iron plates and iron and steel sheets.—*See pages 141-42.*

Wyoming (The) Shovel Works, Wyoming. Shovel plates and light steel sheets.—*See page 279.*

York Mill, Susquehanna Iron Company, Columbia. Works at York. Plate iron.—*For a description of these works see page 152.*

DELAWARE—3.

Minquas Iron Works, McCullough Iron Company, Wilmington. Fine sheet steel, black and galvanized.—*See page 321.*

Newport Rolling Mills, Marshall Iron Company, Newport. Black sheet iron and sheet steel, Nos. 16 to 28 gauge.—*See page 321.*

Wilmington Rolling Mills, Wilmington. Charcoal iron boiler plates, etc.—*Idle and for sale. For description see page 322.*

MARYLAND—1.

Taylor (N. and G.) Company, Philadelphia. Works at Cumberland, Maryland. Sheets.—*For description see pages 323-24.*

VIRGINIA—1.

Tredegar (The) Company, Richmond. Fish plates.—*Pages 329-30.*

WEST VIRGINIA—9.

Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Virginia. Large sheets.—*See page 57.*

Crescent Iron Works, Whitaker-Glessner Company, Wheeling. Iron and steel sheets, galvanized sheets, etc.—*See page 183.*

Follansbee Brothers Company, Pittsburgh. Works at Follansbee, W. Va. Sheets.—*See page 331.*

North American Steel Company, Belington. Iron and steel planished sheets, uniform blued polished sheets, and smooth black and common sheets.—*See page 332.*

Paden City Works, Carter Iron Company, Pittsburgh. Works at Paden City, W. Va. Sheet iron, roofing iron, etc.—*Pages 171-72.*
 Parkersburg (The) Iron and Steel Company, Parkersburg. Fine sheet iron and sheet steel.—*See page 332.*
 Phillips Sheet and Tin Plate Company, Clarksburg. Long sheets.—*See pages 332-33.*
 Top Mill, Wheeling Steel and Iron Company, Wheeling. Iron and steel sheets, nail plate, etc.—*See page 190.*
 Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, W. Va. Nail plate, etc.—*See page 184.*

KENTUCKY—5 COMPLETED AND 1 PARTLY ERECTED.

Ashland Sheet Mill Company, Incorporated, Ashland. Black and galvanized sheets of all grades.—*See pages 335-36.*
 Licking Coal and Iron Company, Incorporated, Covington. Sheet iron.—*See pages 336-37.*
 New Louisville Bolt and Iron Company, Incorporated, Louisville. Sheet department partly erected; work suspended.—*See page 337.*
 Newport Rolling Mill Company, Newport. Steel sheets for roofing, corrugating, and galvanizing purposes.—*See page 337.*
 Norton Iron Works, Ashland. Steel nail and tack plate.—*Page 337.*
 Tennessee Rolling Mills, Ewald Iron Company, Louisville. Plate and sheet iron and tank, shell, and flange steel plates.—*See page 336.*

TENNESSEE—1.

Knoxville Iron Company, Knoxville. Fish plates.—*Pages 342-43.*

ALABAMA—2.

Bessemer Rolling Mills, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Bessemer. Light and heavy plates up to 65 inches wide.—*See page 198.*
 Birmingham Mill, Republic Iron and Steel Company. Works at Birmingham. Iron and open-hearth plates and sheets.—*Pages 94-95.*

OHIO—29.

American (The) Rolling Mill Company, Middletown. Two works in Ohio; black and galvanized sheets, corrugated iron, sheet steel building materials, special analysis armature sheets, etc.—*Page 186.*
 American Sheet and Tin Plate Company, Pittsburgh. Nine mills in Ohio; light plates, iron and steel black plates and sheets for stamping and roofing, galvanized sheets, etc.—*See pages 56-62.*
 Belfont Iron Works Company, Ironton. Nail plate.—*See page 367.*
 Berger (The) Manufacturing Company, Canton. Black and galvanized sheet steel and iron sheets for tinning.—*See page 370.*
 Carnahan Tin Plate and Sheet Company, Canton. Stamping sheets, etc.—*See page 371.*

Cleveland (The) Steel Company, Cleveland. Light steel plates and sheets.—*Page 361.*

Elyria (The) Iron and Steel Company, Elyria. Railroad tie plates.—*Page 361.*

Empire Iron and Steel Company, Niles. Sheet steel specialties, sheets from No. 10 to No. 30 gauge, shovel steel, etc.—*Pages 356-57.*

Kelly Nail and Iron Company, Ironton. Nail plate.—*Pages 367-68.*

Mahoning Valley Works, Republic Iron and Steel Company, Pittsburgh. Works at Youngstown. Tank and plate iron.—*Page 95.*

Martins Ferry Department, Whitaker-Glessner Company, Wheeling, W. Va. Works at Martins Ferry, Ohio. Sheets.—*Page 188.*

Niles (The) Iron and Sheet Company, Niles. Galvanized corrugated and painted corrugated roofing and flat galvanized and flat black sheets; also stamped sheets.—*See page 357.*

Otis Steel Company, Limited, Cleveland. Steel plates.—*Page 362.*

Penn (The) Shovel Manufacturing Company, Warren. Shovel and tack plate for the use of the company and for sale.—*See page 357.*

Portsmouth Steel Company, Wheeling, W. Va. Works at Portsmouth, Ohio. Heavy and light plates and heavy sheets.—*See page 368.*

Steubenville Works, La Belle Iron Works, Steubenville. Universal, annealed, sheared, and special plates, black sheets, etc.—*Pages 183-84.*

Tuscora Works, The United Sheet and Tin Plate Company, Marietta. Works at New Comerstown. Polished, galvanized, and corrugated sheets.—*See page 185.*

United Steel Company, Canton. Steel universal plates.—*Page 374.*

Youngstown (The) Iron and Steel Roofing Company, Youngstown. Sheet iron and sheet steel.—*See page 358.*

Youngstown (The) Sheet and Tube Company, Youngstown. Universal plates and black and galvanized sheets.—*See page 181.*

INDIANA—6 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Atlanta Tin Plate and Sheet Mill, Indianapolis. Works at Atlanta. Sheets, etc.—*See pages 377-78.*

Elwood Plant, Ames Shovel and Tool Company, Boston, Mass. Works at Elwood, Indiana. Shovel plate.—*See page 178.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor. Sheets, light plates, etc.—*See pages 207-8.*

Indiana Rolling Mill Company, New Castle. High-carbon sheet steel for shovel plates.—*See page 379.*

Indiana Steel Company, Chicago. Works at Gary, Ind. Building; will make universal and sheared plates.—*See page 31.*

Midland Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Muncie, Ind. Stamping sheets.—*See page 59.*

Ward-Dickey Steel Company, Indiana Harbor. Now makes hammered sheets; may add hot sheet mills.—*See page 382.*

Western Tin Plate and Sheet Company, Greencastle. Sheets for galvanizing.—*For a description of these works see page 381.*

ILLINOIS—8.

Grand Crossing Tack Company, Grand Crossing. Nail and tack plate.—*See pages 385-86.*

Granite City Steel Works Branch, National Enameling and Stamping Company, New York City. Works at Granite City, Illinois. Plates or sheets for stamping, enameling, etc.—*See page 218.*

Hartmann, Hay & Reis, Belleville. Iron and steel nail, tack, and shovel plate.—*See page 386.*

Illinois Steel Company, Chicago. Two works in Illinois. Boiler, ship, tank, fire-box, universal, and tie plates.—*Pages 26-28.*

Sellers Manufacturing Company, Chicago. Two works in Chicago which make tie plates.—*See page 388.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Mass. Works at Chicago. Saw plate and sheet steel.—*Pages 388-89.*

WISCONSIN—1.

Superior Branch, United States Cast Iron Pipe and Foundry Company, New York City. Works at Superior, Wisconsin. Bessemer steel plates.—*Idle and for sale or lease. See page 399.*

MISSOURI—1.

Granite Iron Rolling Mills Branch, National Enameling and Stamping Company, New York City. Works at St. Louis. Stamping sheet iron, galvanizing sheets, etc.—*See page 218.*

COLORADO—1 PARTLY ERECTED.

Colorado (The) Fuel and Iron Company, Denver. Commenced building at Pueblo in 1902 works for the manufacture of sheets; work suspended.—*For a description of these works see page 228.*

WYOMING—1.

Laramie Rolling Mill, Union Pacific Railroad Company, Laramie. Tie plates for the company's use.—*For description see page 403.*

CALIFORNIA—1.

Judson Manufacturing Company, Emeryville; offices and salesrooms, San Francisco. Tack plate, nail plate, etc.—*See page 406.*

UNITED STATES.

Total number of plants in the United States in November, 1907, which were equipped to roll iron or steel plates or sheets: 159 completed, one building, 2 partly erected, and one projected.

Total number of plate or sheet plants in June, 1904: 157 completed, 2 building, one partly erected, and 4 projected.

IRON AND STEEL BLACK PLATE MILLS.

All mills which are equipped for making black plates or sheets for tinning are included in this list. A few of the works named also make plates and sheets for galvanizing, stamping, enameling, etc. A list of works which are equipped for the manufacture of iron and steel sheets, boiler plates, ship plates, tank plates, nail plates, tack plates, universal plates, sheared plates, tie plates, etc., will be found beginning on page 460.

PENNSYLVANIA—19.

Alcania (The) Company, Pittsburgh. Works at Avonmore. Black plates for tinning.—*See page 311.*

American Sheet and Tin Plate Company, Pittsburgh. Ten mills in Pennsylvania; black plates for tinning.—*See pages 58-61.*

Canonsburg Steel and Iron Works, Canonsburg. Steel and iron black plates for tinning.—*See pages 312-13.*

Griffiths Charcoal Iron Mills, Washington. Black plates for tinning.—*See page 314.*

Lalance and Grosjean Manufacturing Company, Harrisburg; main offices, New York City. Black plates for tinning.—*See page 283.*

Port Vue Mills, McKeesport Tin Plate Company, McKeesport. Works at Port Vue. Black plates for tinning.—*See pages 298-99.*

Sable Iron Works, Zug Iron and Steel Company, Pittsburgh. Black plates for tinning.—*See pages 299-300.*

Standard Tin Plate Company, Canonsburg. Black plates for tinning.—*See page 318.*

Washington Tin Plate Company, Washington. Black plates for tinning.—*See page 319.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Black plates for tinning.—*For a description of these works see page 319.*

MARYLAND—1.

Taylor (N. and G.) Company, Philadelphia. Works at Cumberland, Maryland. Black plates for tinning.—*See pages 323-24.*

WEST VIRGINIA—6.

American Sheet and Tin Plate Company, Pittsburgh. Three mills in West Virginia which make black plates for tinning.—*See pages 57, 58, and 60.*

Crescent Iron Works, (Whitaker Department,) Whitaker-Glessner Company, Wheeling. Black plates for tinning.—*See page 188.*

Follansbee Brothers Company, Pittsburgh. Works at Follansbee, W. Va. Black plates for tinning.—*See page 331.*

Phillips Sheet and Tin Plate Company, Clarksburg. Black plates for tinning.—*For a description of these works see pages 332-33.*

OHIO—9.

American Sheet and Tin Plate Company, Pittsburgh. Four mills in Ohio which are equipped for the manufacture of black plates for tinning.—*See pages 56-58.*

Berger (The) Manufacturing Company, Canton. Iron sheets for tinning.—*See page 370.*

Carnahan Tin Plate and Sheet Company, Canton. Black plates for tinning.—*See page 371.*

Pope Tin Plate Company, 421 Wood street, Pittsburgh. Works at Steubenville, Ohio. Black plates for tinning.—*See page 376.*

United (The) Sheet and Tin Plate Company, Marietta. Two works in Ohio; black plates for tinning.—*See page 185.*

INDIANA—5.

American Sheet and Tin Plate Company, Pittsburgh. Three mills in Indiana; black plates for tinning.—*See pages 56 and 59.*

Atlanta Tin Plate and Sheet Mill, Indianapolis. Works at Atlanta. Black plates for tinning.—*See pages 377-78.*

Western Tin Plate and Sheet Company, Greencastle. Black plates for tinning.—*For a description of these works see page 381.*

ILLINOIS—1.

Granite City Steel Works Branch, National Enameling and Stamping Company, New York. Works at Granite City, Ill. Black plates for stamping, enameling, and tinning.—*See page 218.*

MISSOURI—1.

Granite Iron Rolling Mills Branch, National Enameling and Stamping Company, New York. Works at St. Louis, Missouri. Black plates for tinning.—*For a description of these works see page 218.*

COLORADO—1 PARTLY ERECTED.

Colorado (The) Fuel and Iron Company, Boston Building, Denver. Commenced building works at Pueblo in 1902 for the manufacture of black plates for tinning; not completed; work suspended.—*For a description of these works see page 228.*

UNITED STATES.

Total number of rolling mills and steel works in the United States in November, 1907, which were equipped for the manufacture of black plates for tinning: 42 completed and one partly erected.

Total number of rolling mills and steel works which were so equipped in June, 1904: 49 completed and 3 building.

TINPLATE AND TERNE PLATE WORKS.

In this list the word "tinplates" is limited to pure tin-coated sheets. Sheets coated with a mixture of tin and lead are referred to as "terne plates." The weekly capacity of the works is given as reported by the manufacturers, and, unless otherwise stated, is on single turn in boxes of 112 plates, 14 inches by 20 inches, full weight of 100 pounds. The word "set" refers to the set of tinning pots or the machine used in tinning or coating the black plates. The rolling mill or black plate department of each of the tinplate and terne plate works which makes its own black plates is fully described in Parts I and II of the Directory.

NEW YORK.

Iron Clad Manufacturing Company; main offices, 204-6 Varet st., Brooklyn; factories in Brooklyn; Baltimore branch, Bush and Wicomico sts. Tinning plant erected about 1876 and since greatly enlarged; product, used by the company in the manufacture of milk cans, stamped ware, tinned milk pails, soda-water tanks, ice-cream cans, etc. Fuel, oil and coal. Buys black plates. Long Island City Works, Meurer Brothers Company, 575 Flushing ave., Brooklyn. Works at Long Island City, New York. Built in 1905-6; 8 sets (open stack, Thomas & White, and combination); first tinplates and terne plates made in May, 1906; product, tinplates and terne plates; weekly capacity, 600 boxes of tinplates and 1,900 boxes of terne plates. Fuel, coal. Buy black plates. (In 1906 the company dismantled its former tinplate and terne plate plant at Brooklyn, built in 1894.)

Number of tinplate and terne plate works in New York: 2.

PENNSYLVANIA.

Alcania (The) Company, 503 Murtland Building, Pittsburgh. Tinning plant, originally containing 3 sets, built at Youngstown, Ohio, in 1896 and operated by the Alcania Tin and Terne Plate Company; tinning sets removed to Avonmore, Pa., in 1899 and first tinplates made in September, 1899; now contains 6 Thomas & White sets, 5 for tinplates and one for terne plates; weekly capacity, 2,000 boxes of tinplates and 700 boxes of terne plates. Fuel, bituminous coal. Makes black plates.—*See Rolling Mills and Steel Works, page 311.*

Ferguson Tin Plate Company, Torrens st. & P. R. R., Pittsburgh. Built in 1895; first terne plates made in July, 1895, and first tinplates in September, 1895; 3 pots for terne plates; weekly ca-

- capacity, 900 boxes of 14 x 20-inch terne plates. Fuel, bituminous coal. Buys black plates. Does not now make tinplates. Griffiths Charcoal Iron Mills, Washington. Built in 1901-2; first tinplates and terne plates made in November, 1902; 7 sets, 4 machines and 3 sets of old style for hand dipping; product, terne plates; weekly capacity, triple turn, 1,800 boxes. Fuel, natural gas. Make black plates.—*See Rolling Mills and Steel Works, page 314.*
- Hamilton, (John,) near Tecumseh street, Twenty-third ward, Pittsburgh. Built in 1890 and first terne plates made in April, 1890; burned in 1901 and immediately rebuilt; 3 sets; product, terne plates; weekly capacity, 450 boxes, 20 x 28 inches. Fuel, natural gas. Buys black plates.
- Humbert Works, American Sheet and Tin Plate Company, Pittsburgh. Works at South Connellsville.—*See page 63.*
- Lalanc and Grosjean Manufacturing Company, Harrisburg; main offices, 19 Cliff st., New York; branch offices, Boston and Chicago. Tinning plant added to a rolling mill in 1895; first tinplates and terne plates made in July, 1895; 8 sets for tinplates; weekly capacity, 2,400 boxes. Fuel, bituminous coal. Makes black plates.—*See Rolling Mills and Steel Works, page 283.*
- Merchant and Evans Company, 517 Arch st., Philadelphia. Works on Washington ave., above Twentieth st., Philadelphia. Eight sets; first plates coated in January, 1902; product, tinplates and terne plates. Fuel, coal. Buys black plates. (Formerly operated by Merchant & Co., incorporated.)
- Monongahela Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Pittsburgh.—*See page 63.*
- National Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Monessen.—*See page 64.*
- New Castle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*See page 64.*
- Pennsylvania Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*See page 64.*
- Philadelphia Iron and Tinplate Works, Hughes & Patterson, Incorporated, Philadelphia. Works, Beach and Vienna sts. Tinning plant added to a rolling mill in 1893; first tinplates made in September and first terne plates in December, 1893; 6 sets, 3 for tinplates and 3 for terne plates; weekly capacity, 1,650 boxes of tinplates and 650 boxes of terne plates. Fuel, bituminous coal. Buy black plates.—*Idle. See Hughes & Patterson, page 257.*
- Pittsburgh Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*See page 64.*
- Port Vue Mills, McKeesport Tin Plate Company, McKeesport, Pa. Works at Port Vue. Built in 1902-3 and first tinplates made in

April, 1903 ; 19 sets ; product, tinplates only ; weekly capacity, 14,000 boxes. Fuel, natural gas. Make black plates. Selling agents, Ely and Williams Company, New York.—*See Rolling Mills and Steel Works, pages 298-99.*

Shenango Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*See page 64.*

South Sharon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at South Sharon. (Formerly called the Sharon Works).—*See page 64.*

Standard Tin Plate Company, Canonsburg. Built in 1903-4 ; first tinplates made April 16, 1904, and first terne plates May 18, 1904 ; 10 sets, 8 for tinplates and 2 for terne plates ; weekly capacity, 4,000 boxes of tinplates and 2,000 boxes of terne plates. Fuel, natural gas. Makes black plates.—*See Rolling Mills and Steel Works, page 318.*

Taylor (N. and G.) Company's Tinplate Works, N. and G. Taylor Company, Mariner and Merchant Building, cor. Third and Chestnut sts., Philadelphia. Works on Swanson and Tasker streets. Built in 1891 ; first terne plates made in April and first tinplates in November, 1891 ; 26 sets ; weekly capacity, double turn, 20,000 boxes of either tinplates or terne plates. Fuel, coal. Make black plates.—*See Rolling Mills and Steel Works, pages 323-24.*

United States Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Demmler.—*See page 64.*

Washington Tin Plate Company, Washington. Built in 1899 and first tinplates and terne plates made January 1, 1900 ; 8 sets, 3 for tinplates and 5 for terne plates ; weekly capacity, 1,900 boxes of tinplates and 3,600 boxes of terne plates. Fuel, natural gas. Makes black plates. (Formerly operated by the McClure Company ; acquired by the Washington Tin Plate Company on October 1, 1907).—*See Rolling Mills and Steel Works, page 319.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Built in 1900 and first tinplates and terne plates made in October, 1900 ; 7 sets ; product, terne plates only ; weekly capacity, double turn, 1,800 boxes. Specialty, terne plates having a charcoal iron base. Fuel, natural gas. Make black plates ; also charcoal iron knobbed blooms.—*See Rolling Mills and Steel Works, page 319.*

PURE LEAD-COATED SHEETS.

Ajax (The) Lead Coating Company, 46-52 Richmond st., Philadelphia. Plant erected in 1889 for coating iron or steel sheets with pure lead ; product, flat or corrugated lead-coated sheets up to 44 inches by 12 feet in size ; weekly capacity, 20 to 25 tons. Fuel, bituminous coal. Buys iron or steel sheets.

ALUMINUM-COATED STEEL SHEETS.

American Aluminum Coating Company, lessee, Connellsville. Built in 1900 and first aluminum-coated sheets made February 1, 1901; product, aluminum-coated steel sheets, wire, nails, pipe and fittings, etc.; annual capacity, 2,000 tons. Fuel, natural gas. Buys steel sheets. (Owned and formerly operated by the Steel and Iron Aluminum Coating Company.)

Number of tinplate and terne plate works in Pennsylvania: 21. In addition one plant makes flat or corrugated pure lead-coated sheets and one plant makes aluminum-coated steel sheets, etc.

MARYLAND.

Baltimore Works, American Can Company, 447 West Fourteenth st., New York. Works at Boston and Hudson sts., Baltimore, Maryland. Built in 1895; 16 tinning sets; product, tinplates, all consumed by the company in the manufacture of tin cans; weekly capacity, 10,000 boxes. Fuel, coal. Buy black plates.—*Idle*.

Number of tinplate works in Maryland: one. No terne plate works.

WEST VIRGINIA.

Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Virginia.—*See page 63*.

Follansbee Brothers Company, Liberty and Short sts., Second and Third aves., Pittsburgh. Works at Follansbee, W. Va. Construction commenced in 1903; works completed in 1904; first tinplates and first terne plates made in September, 1904; 10 sets, 5 for tinplates and 5 for terne plates; weekly capacity, 6,000 boxes. Fuel, coal and natural gas. Makes black plates.—*See Rolling Mills and Steel Works, page 331*.

La Belle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wheeling, West Virginia.—*See page 63*.

Phillips Sheet and Tin Plate Company, Clarksburg. Built in 1901-2; first tinplates made in August, 1902, and first terne plates in January, 1906; 16 sets, 2 for terne plates and 14 for tinplates; product, tinplates and terne plates; weekly capacity, 11,000 boxes. Fuel, natural gas. Makes black plates. (Formerly operated by the Jackson Iron and Tin Plate Company; acquired by the present owners on April 11, 1905.)—*See Rolling Mills and Steel Works, pages 332-33*.

Sabraton Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Morgantown, West Virginia.—*See page 64*.

Wheeling Corrugating Company, Wheeling.—*See page 188*.

Number of tinplate and terne plate works in West Virginia: 6.

OHIO.

- Carnahan Tin Plate and Sheet Company, Canton. Built in 1901 and first tinplates and terne plates made in December, 1901; 11 sets, 9 for terne plates, one for coke plates, and one for charcoal plates; weekly capacity, 6,500 boxes of terne plates, 500 boxes of charcoal plates, and 600 boxes of coke plates. Fuel, coal. Makes black plates.—*See Rolling Mills and Steel Works, page 371.*
- Crescent Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cleveland, Ohio.—*See page 63.*
- Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio.—*See page 63.*
- Laughlin Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Martins Ferry, Ohio.—*See page 63.*
- Marietta Works, The United Sheet and Tin Plate Company, Marietta.—*See page 185.*
- Pope Tin Plate Company, 421 Wood st., Pittsburgh. Works at Steubenville, Ohio. Built in 1901-2 and first tinplates made in July, 1902; 18 sets; product, tinplates only. Fuel, coal and natural gas. Makes black plates. Sales made by the company.—*See Rolling Mills and Steel Works, page 376.*
- Number of tinplate and terne plate works in Ohio: 6.

INDIANA.

- American Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Elwood, Indiana.—*See page 63.*
- Anderson Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Anderson, Indiana.—*See page 63.*
- Morewood Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Gas City, Indiana.—*See page 64.*
- Western Tin Plate and Sheet Company, Greencastle. Built in 1902-3; first tinplates and terne plates made April 30, 1903; 9 sets, 7 for tinplates and 2 for terne plates; weekly capacity, 5,500 boxes. Fuel, coal. Makes black plates. (Formerly operated by the Juniata Steel and Iron Company; acquired by the present owners in May, 1905.)—*See Rolling Mills and Steel Works, page 381.*
- Number of tinplate and terne plate works in Indiana: 4.

ILLINOIS.

- Granite City Tinplate Branch, National Enameling and Stamping Company, New York. Works at Granite City, Ill.—*See page 218.*
- Sturges and Burn Manufacturing Company, Harrison and Green sts., Chicago. Original works erected in 1865; first tinplates made in January, 1894; 3 sets; product, tinplates, consumed by the company in the manufacture of milk cans, creamery supplies,

sheet metal specialties, etc.; weekly capacity, 600 boxes. Fuel, coal. Buys black plates.

Number of tinplate and terne plate works in Illinois: 2.

MICHIGAN.

Buhl Stamping Company, Detroit. Tinning plant erected in 1888 and rebuilt in 1895, 1897, and 1900; first tinplates made in 1888; product, tinplates, all consumed by the company in the manufacture of milk-can stock, tubular lanterns, and other tinware. A galvanizing plant is connected with the works. Fuel, coal. Buys black plates.

Number of tinplate works in Michigan: one. No terne plate works.

UNITED STATES.

Total number of tinplate and terne plate works in the United States in November, 1907: 43. Of these 16 are equipped for the manufacture of tinplates only, 4 for the manufacture of terne plates only, and 23 for the manufacture of both tinplates and terne plates. In addition one plant is equipped for the manufacture of flat or corrugated pure lead-coated sheets and one plant for the manufacture of aluminum-coated steel sheets, etc.

Total number of tinplate and terne plate works in the United States in June, 1904: 53 completed, 2 building, and one projected. Of these 16 were equipped for the manufacture of tinplates only, 6 for the manufacture of terne plates only, one for the manufacture of terne plates and lead-coated sheets only, one for the manufacture of redipped terne plates only, 29 for the manufacture of both tinplates and terne plates, 2 plants for the manufacture of tinplates and terne plates were being built, and one plant for the manufacture of tinplates and terne plates was projected. In addition one plant was equipped for the manufacture of flat or corrugated pure lead-coated sheets and one plant for the manufacture of aluminum-coated steel sheets.

Since June, 1904, 13 tinplate and terne plate plants have been abandoned, dismantled, or removed to other sites. Of these 4 were equipped for the manufacture of tinplates only, 2 for the manufacture of terne plates only, one for the manufacture of terne plates and lead-coated sheets only, one for the manufacture of redipped terne plates only, and 5 for the manufacture of both tinplates and terne plates. The number of new plants built since June, 1904, including those removed to new sites, was 3—one in New York, one in West Virginia, and one in Illinois.

THE IRON AND STEEL WORKS

OF

THE UNITED STATES.

PART IV—LATEST INFORMATION.

The information given below comprises changes in ownership of plants and in officers, etc., which were made while the Directory was going through the press, the changes being brought down to March 1, 1908.

PART I—CHIEFLY CONSOLIDATIONS.

THE UNITED STATES STEEL CORPORATION.

American Steel and Wire Company of New Jersey, Cleveland. *New Haven Works*: Now owns and operates the wire rod, wire drawing, and wire nail works at New Haven, Conn., formerly controlled by the National Steel and Wire Company and operated by the National Wire Corporation. The plant was acquired by the present owners in the latter part of 1907 and is known as its New Haven Works.—*See pages 110-11.*

Indiana Steel Company, Chicago. *Blast furnaces*: The company is now erecting 8 blast furnaces at Gary, Ind., with an annual capacity of 1,200,000 tons. *Rolling mills and steel works*: It is also building fifty-six 60-gross-ton basic open-hearth steel furnaces, with an annual capacity of 2,000,000 tons of ingots, and one rail mill, one billet mill, and an iron and steel foundry.—*Pages 30-31.*

National Tube Company, Pittsburgh. *Building furnace at McKeesport, Pa.*: Furnace D completed; first blown in October 10, 1907. *Selling agencies*: Now located as follows: New York, Battery Park Building; Philadelphia, Pennsylvania Building; Pittsburgh, Frick Building; Chicago, Commercial National Bank Building; St. Louis, Chemical Building; San Francisco, Crocker Building; Portland, Oregon, Wells-Fargo Building; Denver, Majestic Building; New Orleans, Maison Blanche Building; and Atlanta, Ga., Candler Building.—*See pages 35-36.*

National (The) Tube Company (of Ohio), Lorain, Ohio. *Building furnace at Lorain*: Furnace E completed; first blown in September 26, 1907. *New open-hearth steel plant at Lorain*: Now erecting six 60-gross-ton basic open-hearth furnaces.—*See pages 31-32.*

Shelby Steel Tube Company, Pittsburgh. *Selling agencies*: Same as the National Tube Company.—*See pages 39-40; also page 477.*

Tennessee Coal, Iron, and Railroad Company, Birmingham. *Control of stock*: A majority of the stock of this company is now owned by the United States Steel Corporation. *Changes in officers*: John A. Topping is no longer Chairman; George G. Crawford is President; L. T. Beecher is Secretary and Treasurer, *vice* W. A. Green; and F. B. Winslow is Auditor, *vice* T. M. Nesbitt. *Selling agencies for all products other than coal and coke*: Woodward Building, Birmingham; Carnegie Building, Pittsburgh; Empire Building, New York; Pennsylvania Building, Philadelphia; Rockefeller Building, Cleveland; Commercial National Bank Building, Chicago; Union Trust Building, Cincinnati; Chemical Building, St. Louis; Union Trust Building, Detroit; 203 Ellicott Square, Buffalo; 125 Milk st., Boston; Pioneer Press Building, St. Paul; Wells-Fargo Building, Portland; Crocker Building, San Francisco; Equitable Building, Denver; and Maison Blanche Building, New Orleans. *Selling agencies for coal and coke*: Woodward Building, Birmingham, and 325 Carondelet st., New Orleans. *Foreign sales*: All foreign sales are made by the United States Steel Products Export Company, 21 State st., New York.—*See page 196.*

Universal Portland Cement Company, Chicago. *Plant No. 1 at North Chicago, Ill.*: Abandoned; dismantled in November, 1907. *Plant No. 4 at Buffington, Ind.*: Completed; first put in operation October 27, 1907. *Plant No. 5 at Universal, Pa.*: Completed; first put in operation January 2, 1908.—*See page 34.*

Western Tube Company, Kewanee, Ill. *Selling agencies*: Same as the National Tube Company. *Name of works*: Now known as the Kewanee Works.—*See page 389; also page 477.*

INDEPENDENT COMPANIES.

American Car and Foundry Company, St. Louis. *Change in address of St. Louis offices*: General offices now located in the Syndicate Trust Building, 915 Olive st. *Change in address of New York offices*: After May 1, 1908, the New York offices will be located in the City Investing Company's Building, 165 Broadway.—*Page 220.*

American Steel Foundries, Chicago. *East St. Louis Works*: Now make cast steel car wheels as well as general railroad steel castings. *Pittsburgh Works*: Now equipped with 2 acid open-hearth furnaces, (one 10 and one 12-gross-ton.)—*See pages 125-27.*

Bethlehem Steel Company, South Bethlehem, Pa. *Blast furnaces*: Now known as A, B, C, D, and E. *Saucon Plant*: Open-hearth steel first made August 12, 1907; steel rails first rolled August 31, 1907; Grey universal mill started January 9, 1908.—*Pages 104-7.*

- Carter Iron Company, Pittsburgh. *Paden City Works, Paden City, W. Va.*: First started in the fall of 1905.—*See pages 171-72.*
- Colorado (The) Fuel and Iron Company, Denver. *Changes in officers*: E. L. Wiles is no longer Assistant to President and Albert A. Miller is no longer Treasurer, both positions being vacant; L. M. Bowers, Denver, is Vice President; no other changes in officers.—*See page 225.*
- Helmbacher Forge and Rolling Mills Company, St. Louis. *Change in address of St. Louis offices*: General offices now in the Syndicate Trust Building, 915 Olive st.—*See page 219.*
- International Harvester Company, Chicago. *Change in Chicago address*: General offices now located in the Harvester Building, Michigan ave. and Harrison st., Chicago.—*See page 209.*
- National (The) Malleable Castings Company, Cleveland. Works at Sharon, Pa. *Equipment*: Now equipped with three 15-gross-ton acid and four 25-ton basic open-hearth furnaces.—*Pages 175-76.*
- National Steel and Wire Company, New York. *Plant of the National Wire Corporation*: Now owned and operated by the American Steel and Wire Company of New Jersey and known as its New Haven Works.—*See pages 110-11; also page 477.*
- New Jersey (The) Zinc Company, New York. *General Superintendent*: George G. Convers died March 10, 1908.—*See pages 119-20.*
- Phoenix (The) Iron Company, Philadelphia. *Purchasing Agent*: D. A. Clarke, Purchasing Agent, died March 16, 1908.—*Page 131.*
- Pittsburgh Steel Company, Pittsburgh. *Monessen Works*: Eight 60-gross-ton basic open-hearth steel furnaces are being added.—*See pages 168-69.*
- Republic Iron and Steel Company, Pittsburgh. *Changes in officers*: John A. Topping, 115 Broadway, New York, former President, is now Chairman of the Board of Directors, and T. W. Guthrie, Frick Building Annex, Pittsburgh, former Assistant to President, is now President; no other changes in officers.—*See page 93.*
- Shenango (The) Furnace Company, Pittsburgh. *Furnaces at Sharpsville, Pa.*: Old No. 2 furnace has been abandoned.—*See page 173.*
- Southern Steel Company, Birmingham. *Receivers*: Company went into the hands of Receivers on October 25, 1907; present Receivers: Edgar Alder, E. M. Chandler, J. O. Thompson, and T. G. Bush, Birmingham. *Trustees*: The following Trustees were appointed on February 3, 1908: W. H. Hassinger and John E. Morris, Birmingham, and T. S. Kyle, Gadsden.—*See pages 200-2.*
- Tennessee Coal, Iron, and Railroad Company, Birmingham.—*See pages 196-200; also page 478.*
- Thomas (The) Iron Company, Easton, Pa. *Superintendent*: Horace Boyd, Superintendent, succeeds David H. Thomas, General Super-

- intendent, resigned. *New York selling agent*: George McMurtrie Godley, 2 Rector st., is now selling agent.—*See page 129.*
- United Engineering and Foundry Company, Pittsburgh. *Open-hearth steel casting department*: Works at Vandergrift, Pa., are now equipped with two 20-gross-ton acid open-hearth furnaces instead of two 15-gross-ton basic furnaces.—*See pages 176-77.*
- United (The) Sheet and Tin Plate Company, Marietta, Ohio. *Byesville Works*: Partly erected basic open-hearth furnace dismantled and property sold. *Marietta Works*: Rolling mill and tinning plant still at Marietta but idle. *Tuscora Works*: Dismantled and machinery removed to Hazleton, Pa., where it is being utilized by the Hazleton Sheet Steel Company in equipping a new rolling mill at Hazleton.—*Page 185; also page 481.*
- Wharton Steel Company, Philadelphia. *Change in ownership*: This company now owns and operates the plants and properties formerly owned and operated by Joseph Wharton. Its officers are Joseph Wharton, President, J. Bertram Lippincott, Vice President, Harrison S. Morris, Treasurer, and Harry C. Wenner, Secretary, Philadelphia; and Edward Kelly, General Manager, Wharton, N. J. Capital stock, \$10,000,000, all owned by Mr. Wharton.—*Pages 117-19.*
- Youngstown (The) Sheet and Tube Company, Youngstown, Ohio. *Purchase of new works*: Has purchased plant of Morgan Spring Company at Struthers, Ohio; possession taken March 16, 1908.—*See pages 180-81; also pages 357-58.*

PART II—BY STATES AND DISTRICTS.

MASSACHUSETTS.

- Kinsley Iron and Machine Company, Canton. Company out of business; property to be sold at public auction.—*See page 233.*

RHODE ISLAND.

- Providence Steel Casting Company, Providence. Works not sold down to February 25, 1908.—*See page 236.*
- Washburn Wire Company, Phillipsdale. Auburn Plant dismantled in 1907. Machinery added to Phillipsdale Plant.—*See pages 236-37.*

NEW YORK.

- Burgess & Dickinson, Dunkirk. Completed; now called Atlas Steel Works; first crucible castings made January 27, 1908.—*Page 244.*
- Lash (The) Steel Process Company of Ohio, White Building, Buffalo. Building works at Niagara Falls; construction commenced October 1, 1907; one 6-gross-ton basic furnace for the manufacture of soft steel ingots by electricity by the Lash process; daily capacity, 25 tons. Horace W. Lash, President, Cleveland; Louis

J. Hirt, Vice President, New York City; Seward Babbitt, Secretary and General Manager, Buffalo.—*Not described in Directory.*
 Strong Steel Foundry Company, Buffalo. Building works at Buffalo to be equipped with one 6-gross-ton Siemens acid open-hearth steel furnace and one 20-pot crucible steel-melting furnace; product, castings. Fuel, oil.—*Not described in the Directory.*

PENNSYLVANIA.

Hazleton Sheet Steel Company, Hazleton. Building works to make sheet steel; equipment from dismantled Tuscora Works of United Sheet and Tin Plate Company utilized.—*See page 479.*
Not described in the Directory.

Kittanning Iron and Steel Manufacturing Company, Pittsburgh. Old Rebecca Furnace at Kittanning is being dismantled.—*Page 311.*
 Longmead Iron Company, Conshohocken. Jawood Lukens, President and Treasurer, died March 10, 1908; succeeded by Lewis N. Lukens.—*See page 269.*

Parkesburg (The) Iron Company, Parkesburg. Adding a tube mill; product, charcoal wrought iron pipe and boiler tubes.—*Page 273.*

Tidewater Steel Company, Chester. H. H. Houston is Receiver.—*See pages 145 and 274-75.*

Warwick Iron and Steel Company, Pottstown. Philip Doerr is Vice President and H. F. Hallman Secretary and Treasurer.—*Page 265.*

OHIO.

Bird (The) Iron Company, Culbertson. The officers now are Levi D. York, President; E. J. Bird, Vice President and General Manager; and H. R. Brown, Secretary and Treasurer.—*See pages 363-64.*

Iron-ton (The) Iron Company, Iron-ton. Blast furnace completed; not blown in down to March 1, 1908.—*See page 364.*

Jackson Iron and Steel Company, Jackson. Blast furnace known as "Jisco," located at Jisco, on the D. T. & I. R. R.; completed in January but not blown in down to March 1, 1908.—*Pages 364-65.*

Morgan Spring Company, Worcester, Mass. Sold plant at Struthers, Ohio, in 1908, to the Youngstown Sheet and Tube Company.—*See pages 357-58 and 480.*

Youngstown (The) Steel Company, Youngstown. Edward L. Ford is President and General Manager; no other changes.—*Page 356.*

ILLINOIS.

Calumet Steel Company, Chicago. Works at Chicago Heights completed; first put in operation February 28, 1908.—*See page 384.*

Robey Street Works, American Rolling Mill Corporation, Chicago. Plant now owned by Ana S. Taft.—*See page 388.*

Western Tube Company, Kewanee. Selling agencies same as National Tube Company; known as Kewanee Works.—*Pages 389 and 477.*

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CANADIAN SUPPLEMENT
TO THE
DIRECTORY TO THE IRON AND STEEL
WORKS OF THE UNITED STATES.

CONTAINING A COMPLETE LIST
OF THE
BLAST FURNACES, ROLLING MILLS,
AND STEEL WORKS IN CANADA.

COMPILED AND PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

CORRECTED TO DECEMBER 1, 1908.

PHILADELPHIA:
THE AMERICAN IRON AND STEEL ASSOCIATION,
No. 261 SOUTH FOURTH STREET.
1908.

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THE IRON AND STEEL WORKS

OF

THE DOMINION OF CANADA.

COMPILED BY THE AMERICAN IRON AND STEEL
ASSOCIATION.

THE following list embodies a description of all blast furnaces, rolling mills, steel works, and tinplate works in Canada that are now active or may possibly be active at some future time ; also descriptions of plants for the manufacture of ferro-alloys and steel by electricity. The dimensions for blast furnaces relate to their present size. When the power is not mentioned steam power is to be understood. Unless otherwise stated capacities are given in gross tons of 2,240 pounds and on double turn.

NOVA SCOTIA.

BLAST FURNACES—6 ACTIVE COKE STACKS.

Dominion Iron and Steel Company, Limited, Sydney, Cape Breton county. Four stacks, each 85 x 20, and each equipped with four Cowper-Kennedy stoves, each 85 x 21 ; construction commenced in 1899 ; No. 1 blown in February 4, 1901 ; No. 2, May 9, 1901 ; No. 3, October 21, 1901 ; and No. 4, January 18, 1902 ; fuel, coke obtained from the company's ovens ; ores, Wabana red hematite from the company's mines on Belle Island, Newfoundland ; product, basic and foundry pig iron ; total annual capacity, 400,000 tons. Brands, "Disc" and "Dominion." Equipped with one double Heyl & Patterson pig-iron casting machine. Molten metal from these furnaces is conveyed in ladles to a 300-gross-ton mixer in the company's steel department. A coke plant containing 500 Otto-Hoffmann by-product ovens, with a total annual capacity of 450,000 net tons, is connected with the furnaces ; also a coal-washing plant with a capacity of 4,000 tons per day ; also a plant for the manufacture of carbolic acid, pitch, creosote, and other oils, which is operated by the Dominion Tar and Chemical Company ; also a plant for the manufacture of cement from blast furnace slag, which is operated by the Sydney Cement Company, Limited.—*All furnaces active in 1908. See Rolling Mills and Steel Works in this Province, pages 4-5.*

Londonderry (The) Iron and Mining Company, Limited, Montreal, Quebec. Works at Londonderry, Colchester county, Nova Scotia. Furnace A, one stack, 60 x 25, built in 1875-6 and blown in in 1877; rebuilt in 1883, 1891, 1895, 1903, and 1907; three Siemens-Cowper fire-brick stoves; fuel, coke made from coal mined in Pictou and Cumberland counties; ores, limonite, carbonate, and red hematite from mines owned by the company in Colchester and Annapolis counties; product, foundry pig iron; annual capacity, 35,000 tons. Brand, "Londonderry." Connected with the furnace is a coal-washing plant with an annual capacity of 60,000 net tons; also a plant containing 97 coke ovens with an annual capacity of 40,000 net tons; also a machine shop; also a cast-iron pipe foundry, which is owned and operated by the Canadian Iron and Foundry Company, Limited, of Montreal. Thomas J. Drummond, President, Edgar McDougall, Vice President, and F. G. O'Grady, Secretary and Treasurer, Montreal; William Brown, Superintendent, Londonderry. Selling agents, Drummond, McCall & Co., Canada Life Building, Montreal. (Furnace B, one stack, 62 x 18, built in 1875-6, dismantled in 1905.)—*Furnace A active in 1908.*

Sydney Mines Furnace, Nova Scotia Steel and Coal Company, Limited, New Glasgow, Pictou county. Furnace at Sydney Mines, Cape Breton county. One stack, 85 x 17½; commenced building in June, 1902; completed and blown in August 30, 1904; four Roberts stoves, each 85 x 12; fuel, coke made from coal mined near the furnace; ores, local brown and red hematite and Wabana from Newfoundland; product, foundry and basic pig iron; annual capacity, 70,000 tons. Brand, "Scotia." Equipped with one pig-iron casting machine. Molten metal from the furnace is conveyed in ladles to a 75-gross-ton mixer in the Sydney Mines Steel Works. Charles S. Holmes, Furnace Superintendent. (Ferrona Furnace, at Ferrona, one stack, 65 x 15, built in 1892, and last active in June, 1904, abandoned but not dismantled.)—*Active in 1908. See Rolling Mills and Steel Works in this Province, pages 5-6.*

Number of active coke furnaces in Nova Scotia: 6. In addition one coke furnace which is still standing is abandoned. There are no charcoal furnaces in this Province.

ROLLING MILLS AND STEEL WORKS—5.

Dominion Iron and Steel Company, Limited, Sydney, Cape Breton county. Built in 1900-1 and since greatly enlarged; 4 four-hole soaking pits, 2 special pit furnaces, ten 50-gross-ton basic open-hearth steel furnaces, two 15-gross-ton acid Bessemer steel

converters, one 300-gross-ton metal mixer, one 35-inch direct reversing blooming mill, one Morgan continuous billet mill with 6 stands of 16-inch rolls, one Morgan continuous rod mill with 14 stands of 12-inch roughing and 10-inch finishing rolls, and one 28-inch rail mill; first open-hearth steel ingots made December 31, 1901, first blooms rolled in February, 1902, first billets rolled in May, 1902, first wire rods rolled in May, 1904, and first steel rails rolled June 14, 1905; the Bessemer converters, which were added in 1907 and first put in operation in May of that year, are used for desiliconizing and decarburizing molten metal for the open-hearth furnaces and Bessemer steel is not made; product, open-hearth steel ingots, blooms, billets, slabs, steel rails, and wire rods; annual capacity, 400,000 tons of ingots, 375,000 tons of blooms, billets, and slabs, 300,000 tons of steel rails, and 60,000 tons of wire rods. Fuel, manufactured gas. Molten metal is taken in ladles from the blast furnaces of the company to the metal mixer and thence conveyed in ladles to the Bessemer converters and open-hearth furnaces. A gray iron foundry with an annual capacity of 4,500 tons is connected with the works; also a brass foundry and a machine shop, both for the use of the company. J. H. Plummer, President; L. J. Forget, Vice President; C. S. Cameron, Secretary and Treasurer; F. P. Jones, General Manager; W. C. Mitchell, General Superintendent; J. P. McNaughton, General Sales Agent. —See *Blast Furnaces in this Province*, page 3.

Nova Scotia Steel and Coal Company, Limited, New Glasgow, Pictou county. Two works, one at New Glasgow and one at Sydney Mines. New Glasgow Works, at New Glasgow: forge built in 1872; open-hearth steel plant added in 1882 and first steel made in August, 1883; hot trains of rolls added in 1883 and first put in operation in August of that year; 15 forge fires, 12 coal and 3 gas heating furnaces, 4 trains of rolls, (one 2-high 26-inch reversing blooming and billet, one 3-high 20-inch plate, one combined 3-high 18 and 9-inch mill, and one 3-high 9-inch guide,) 5 hammers, (from 10 cwt. to 5 tons,) and 2 automatic spike machines; product, railway, marine, and engine forgings up to 15 tons, cold-drawn polished shafting, car axles, mine and tram rails from 12 to 40 pounds, fish plates, tie plates, angle bars, machinery, car, spring, and agricultural-implement steel, steel plates up to 50 inches wide, angles, flats, and iron and steel merchant bars; steel rolled from ingots obtained from the Sydney Mines Steel Works; annual capacity, 60,000 tons of finished rolled and forged products and 7,500 tons of railway spikes; fuel, bituminous coal and

producer gas; connected with the works are machine and structural shops, shops for building coal and ore cars, engines, etc.; (these works were formerly equipped with 4 basic open-hearth steel furnaces, which were dismantled in 1906.) Sydney Mines Steel Works, at Sydney Mines, Cape Breton county: built in 1904-5; three stationary Wellman 40-gross-ton basic open-hearth steel furnaces, 16 gas producers, and one 75-gross-ton tilting metal mixer; first open-hearth steel made July 16, 1905; product, ingots, which are shipped to New Glasgow and there rolled or forged into finished forms; annual capacity, 70,000 tons; fuel, manufactured gas; molten metal is taken in ladles from the blast furnace of the company to the metal mixer and thence conveyed in special cars to the open-hearth furnaces. The company owns extensive coal mines near New Glasgow and at Sydney Mines with an annual capacity of 900,000 gross tons; also 120 Bernard and 30 Bauer retort coke ovens at Sydney Mines with an annual capacity of 100,000 net tons; also limestone quarries with an annual capacity of 100,000 gross tons; also iron ore mines on Belle Island with an annual capacity of 500,000 gross tons; also iron and brass foundries, freight steamships, railroads, a general store, dwelling houses, etc. Robert E. Harris, President, Halifax; James D. McGregor, Vice President, Archibald McColl, Secretary and Chief Accountant, Thomas Cantley, General Manager, Thomas Green, Assistant Secretary and Cashier, John Irving, General Sales Agent of the Iron and Steel Department, Henry Ritchie, Purchasing Agent, and John Fellows, Superintendent New Glasgow Works, New Glasgow; Thomas J. Brown, General Superintendent Sydney Mines Steel Works, and John W. Fraser, Superintendent of Open Hearth Department, Sydney Mines.—*See Sydney Mines Furnace in this Province, page 4.*

Rhodes, Curry & Co., Limited, Amherst, Cumberland county. Branch offices, Halifax and Sydney. Shops for building cars erected in 1893, forge shop added in 1902, and hot trains of rolls installed in 1906-7; first products rolled April 18, 1907; one busheling furnace, 2 scrap furnaces, 2 welding furnaces which are also used as scrap furnaces, 2 coal-fired heating furnaces, one forge fire, 2 nut machines, one 5-ton hammer, one combination train of rolls with 9 and 16-inch mills, and 2 shears; product, rounds from $\frac{3}{4}$ of an inch to $3\frac{1}{2}$ inches, flats from $\frac{3}{4}$ of an inch to 12 inches, angles and other sections, nuts, and forged steel axles and other car forgings; annual capacity, 12,000 tons of rolled material, 12,000 tons of axles and other forgings, and 600 tons of nuts. Fuel,

coal and coke. A gray iron foundry with an annual capacity of 6,500 tons and a car-wheel foundry with an annual capacity of 10,000 tons are connected with the works; also a machine shop, planing mill, etc.; also shops for building passenger and freight cars for steam railways, street cars, etc. N. Curry, President and General Manager; N. A. Rhodes, Vice President; J. M. Curry, Secretary and Treasurer.

Starr (The) Manufacturing Company, Limited, Dartmouth, Halifax county. Built in 1896 and first put in operation in that year; 4 heating furnaces, 2 trains of rolls, (one 10-inch and one 18-inch,) and 2 hammers; product, merchant bar iron in rounds, squares, and flats; annual capacity, single turn, 10,800 tons. Fuel, coal. Also makes skates, bolts, nuts, rivets, railway and ship spikes, carriage axles, and iron and steel forgings. J. C. Mackintosh, President; James Simmonds, Vice President; H. E. Hill, Director and Manager of Rolling Mills and Forge; H. Goudge, Secretary and General Manager; G. G. Dustan, Auditor. (Formerly called the Dartmouth Rolling Mills, Limited; acquired by the present company on May 1, 1907.) Number of rolling mills and steel works in Nova Scotia: 5. Of these one has Bessemer steel converters but does not make Bessemer steel and 2 make open-hearth steel.

NEW BRUNSWICK.

ROLLING MILLS—1.

Portland Rolling Mills, The Portland Rolling Mills, Limited, Strait Shore, St. John, St. John county. Works built in 1856 and rolling mill added in 1860; burned and rebuilt in 1889; one single puddling furnace, 8 heating furnaces, 4 trains of rolls, (one 9, one 12, and one 18-inch bar and one 18-inch nail plate,) 3 railway spike machines, one 5-ton helve hammer, 38 cut-nail machines, and 18 tack and shoe-nail machines; also a complete set of horseshoe machinery; product, bar iron, car axles, nail plate, street and mine rails, fish plates, ship and railway spikes, knees for ships, shafting, cut nails, shoe nails, tacks, horseshoes, bolts, nuts, etc.; annual capacity, single turn, 10,000 tons of finished rolled products, 150 tons of shoe nails and tacks, 31,000 kegs of cut nails, 2,300 tons of ship and railway spikes, 14,000 kegs of horseshoes, and 900 kegs of bolts and nuts. Fuel, coal. Brand, "Monarch." James Manchester, President; D. J. Purdy, Vice President; Walter L. Smith, Secretary.

Number of rolling mills in New Brunswick: one. There are no blast furnaces or steel works in this Province.

QUEBEC.

BLAST FURNACES—3 COMPLETED CHARCOAL STACKS.

Canada Iron Furnace Company, Limited, Canada Life Building, Montreal. Furnace at Radnor Forges, Champlain county. One stack, 46 x 9½, built and blown in in 1891; steam and water power; one Drummond pipe stove; warm blast; fuel, charcoal; ores, lake and bog from the company's mines in the Three Rivers district and Lac-a-la-Tortue; product, special charcoal pig iron for car wheels, chilled rolls, etc.; annual capacity, 10,000 tons. Brand, "C. I. F." (The present stack takes the place of the old Radnor Furnace.) Company also makes charcoal in kilns. George Gudewill, President, 26 West Fifty-second st., New York City; Frank Leeming, Vice President, Brantford, Ontario; George E. Drummond, Managing Director and Treasurer, and Thomas J. Drummond, Secretary, Montreal; John J. Drummond, General Superintendent, Midland, Ontario. Selling agents, Drummond, McCall & Co., Canada Life Building, Montreal.—*Active in 1908.* See *Midland Furnace in Ontario, page 12.*

McDougall (John) & Co., 597 William st., Montreal. Furnaces at Drummondville, Drummond county. Two stacks: Grantham Furnace, 35 x 10, built and blown in in 1880 and rebuilt in 1907; St. Francis Furnace, 32 x 9, built and blown in in 1881; two stoves; warm blast; water-power; fuel, charcoal; ore, local limonite; product, car-wheel pig iron; total annual capacity, 4,800 tons. Connected with the furnaces are 17 charcoal kilns with an annual capacity of 1,621,800 bushels of charcoal, 20 pounds to the bushel. J. A. Manseau, Manager. Sales made by the firm.—*Both furnaces active in 1908.*

Number of blast furnaces in Quebec: 3 completed charcoal stacks. There are no coke furnaces in this Province.

ROLLING MILLS AND STEEL WORKS—6 COMPLETED AND 1 TO BE REBUILT.

Best Steel Casting Company, Limited, Verdun, Jacques Cartier county. Built in 1907; one 10-gross-ton basic open-hearth steel furnace; first steel made in December, 1907; product, low-carbon steel castings; annual capacity, 9,000 tons. Fuel, oil. Brand, "Best Steel Casting." Also makes gray iron castings. O. L. Henault, President and General Manager; L. H. Henault, Vice President; J. A. A. Leclair, Secretary, Treasurer, and Purchasing Agent.

Grand Trunk Railway Rolling Mill, Grand Trunk Railway System, Montreal. Works at Point St. Charles, Montreal. Built in

1891-2 and put in operation May 9, 1892; 2 heating furnaces and one 3-high 12-inch train of rolls; product, bars, angles, and tees; annual capacity, 7,000 tons. Fuel, bituminous coal.

A. A. Maver, Superintendent of Rolling Mill.

Montreal (The) Rolling Mills Company, Montreal. Two rolling mills and a wrought iron and steel pipe plant. Ste. Cunegonde Works, on Lachine Canal, Hochelaga county: built about 1857; destroyed by fire March 24, 1900, but at once rebuilt; 7 coal and 3 gas heating furnaces and 4 trains of rolls (one 18-inch muck, one 9-inch Belgian, and one 12 and one 18-inch); product, bar iron and bar steel, horseshoe iron, railway joints, angle bars, tie plates, nail plate, skelp, horseshoes, horse nails, wire, wire nails, cut nails, bolts, nuts, rivets, tacks, staples, etc.; annual capacity, 35,000 tons of finished rolled iron and steel, 100,000 kegs of horseshoes, 30,000 boxes of horse nails, 25,000 tons of wire, 250,000 kegs of wire nails, and 30,000 kegs of cut nails; lead pipe, shot, putty, white lead, etc., are also made; fuel, producer gas and bituminous coal; brand, "M. R. M. Co." inclosed in a semi-circle; trade mark for steel horseshoes, "XL." **St. Patrick Street Department, 104 St. Patrick st., Montreal:** built in 1859; 4 heating furnaces and 2 trains of rolls (one 9-inch Belgian and one 18-inch); product, bar iron and bar steel, railway and pressed spikes, track bolts, nuts, rivets, and washers; annual capacity, 25,000 tons of bar iron and steel, 125,000 kegs of railway and pressed spikes, and 5,000 tons of bolts, nuts, etc.; fuel, coal; (formerly operated by the Pillow and Hersey Manufacturing Company, Limited.) **St. Henri Department, Montreal:** rebuilt in 1906; one butt-welding furnace and 4 gas producers; product, wrought iron and steel pipe, black and galvanized, and conduit, fence, and signal pipe; also couplings and nipples; sizes of pipe, from $\frac{1}{4}$ inch to 4 inches; annual capacity, 25,000 tons; fuel, producer gas. **Sir E. S. Clouston, President;** **William McMaster, Vice President and General Manager;** **James L. Waldie, Secretary-Treasurer;** **J. R. Kinghorn, Assistant to General Manager and General Sales Agent;** **Charles J. Hempey, Purchasing Agent.** Selling agents, **J. G. T. Cleghorn, Winnipeg;** **J. B. H. Rickaby, Victoria;** **W. A. Maclellan, Vancouver;** and **George D. Hatfield, Halifax.**

Montreal Steel Works, Limited, Canal Bank, Point St. Charles, Montreal. Built in 1883; one 3,000-pound modified acid Bessemer converter added in 1897 and first steel made in that year (idle); one 15-gross-ton acid open-hearth steel furnace added in 1901 and an additional 15-gross-ton acid furnace built in 1903; product, steel castings for railway, mining, and other purposes;

also manganese steel castings ; annual capacity, 12,000 gross tons of open-hearth and manganese steel castings. Fuel, coal and coke. Shop mark, "M. S." in a circle. Also make springs, switches, and track work for steam and electric roads ; also gray iron castings. A machine shop is connected with the works. K. W. Blackwell, President ; J. R. Wilson, Vice President ; W. F. Angus, Vice President and General Manager ; C. H. Godfrey, Vice President, Secretary, and Treasurer ; and G. D. Smith, Superintendent.

National Tool and Axe Works, Three Rivers, St. Maurice county. Built in 1880 ; one furnace for the manufacture of steel by a secret process added in 1900 ; first steel made in July, 1900 ; destroyed by fire in February, 1908 ; to be rebuilt in the spring of 1909 and to be equipped with one 20-gross-ton basic open-hearth melting furnace, one 10-ton cupola, six 20-ton annealing furnaces, and one small brass melting furnace ; product, steel castings for railroad and street cars, malleable castings, brass castings, axes, tools, etc. ; annual capacity, about 5,000 tons of steel castings and 3,000 tons of malleable and brass castings. Fuel, coal and coke but natural gas may be used. A machine shop for the use of the company will be connected with the plant. T. G. Hawthorn, President and Treasurer ; A. F. Hawthorn, Vice President ; H. H. Hawthorn, Secretary. Sales to be made by the company.—*Will probably be completed and ready for operation in the summer of 1909.*

Peck (The) Rolling Mills, Limited, 210 Coristine Building, Montreal. Works on Lachine Canal. Established in 1838 ; rolling mill destroyed by fire August 3, 1898 ; rebuilt in 1899 ; partly burned in 1903 and rebuilt and put in operation in the same year ; steam and water power ; equipped with heating furnaces, trains of rolls, cut and wire-nail machines, tack machines, horse-shoe machines, etc. ; product, bar iron and bar steel, light rails, shovel plate, railway spikes, ship spikes, cut nails, wire nails, tacks, iron and steel horseshoes, washers, etc. Fuel, bituminous coal. Brand, "P. B." in a circle. Thomas Peck, President ; T. E. Peck, Vice President and Managing Director ; E. J. Fry, Secretary-Treasurer.—*This company declines to give a detailed description of its equipment.*

Number of rolling mills and steel works in Quebec : 6 completed and one to be rebuilt. Of these 2 make open-hearth steel castings, one has an idle modified Bessemer converter which was formerly used in the manufacture of steel castings, and one open-hearth plant for the manufacture of steel castings is to be rebuilt.

ONTARIO.

BLAST FURNACES—6 COMPLETED, 1 REBUILDING, AND 2 PROJECTED.

Algoma (The) Steel Company, Limited, Sault Ste. Marie, Algoma district. Two completed stacks and two stacks for which ground was broken in 1901 but upon which work has since been suspended. Completed stacks: Furnace No. 1, 70 x 17, built in 1901-3; originally blown in with charcoal on March 6, 1905; changed to coke and first coke pig iron made July 10, 1905. Furnace No. 2, 80 x 15½, built in 1901-3 and first blown in with coke on October 17, 1904. The two furnaces are equipped with seven Foote fire-brick stoves, each 70 x 18; fuel, Pennsylvania and West Virginia coke; ores, native and Mesabi and old range from Lake Superior; product, Bessemer and basic pig iron; annual capacity, 230,000 tons. Brand, "Algoma." One 3-strand Heyl & Patterson pig-iron casting machine is connected with the furnaces. Molten metal from the furnaces is conveyed in ladles to a 150-ton mixer in the company's steel department. Plants for the manufacture of charcoal, containing 20 retorts with a daily capacity of 160 cords of wood and 56 bee-hive kilns with a daily capacity of 180 cords, are also operated by the company; also plants for the manufacture of wood alcohol and acetate of lime. The two projected furnaces will use coke for fuel and will be known as Nos. 3 and 4. Raymond Lewis, Superintendent of Furnaces. Controlled by the Lake Superior Corporation.—*Completed furnaces both active in 1908. See Rolling Mills and Steel Works in this Province, pages 13-14.*

Atikokan Furnace, Atikokan Iron Company, Limited, Port Arthur. One stack, 80 x 16; construction commenced in May, 1905; first blown in on July 16, 1907; three Roberts-Cowper hot-blast stoves, each 70 x 18; fuel, coke made in the company's ovens; ores, roasted magnetic from the company's mines; product, foundry pig iron; annual capacity, 50,000 tons. Brand, "Atikokan." D. D. Mann, President, No. 1 Toronto st., Toronto; J. Dix Fraser, General Manager, Port Arthur; Hugh Sutherland, Treasurer, Winnipeg, Manitoba.—*Active in 1907.*

Deseronto Furnace, The Standard Chemical Company of Toronto, Limited, Toronto. Furnace at Deseronto, Hastings county. One stack, 61 x 10½, built in 1898 and blown in with charcoal as fuel on January 25, 1899; fuel changed to coke in 1906 and first coke pig iron made in September, 1906; seriously damaged by fire on September 1, 1908; now being rebuilt; when again blown in charcoal will be used for fuel;

two iron pipe stoves; warm blast; ores, American, from the Lake Superior region, and small quantities of local; product, malleable and car-wheel pig iron; annual capacity, 20,000 tons. Brand, "Deseronto." Also operates fifty 6-cord charcoal ovens with an annual capacity of 4,500,000 bushels; also makes wood alcohol, acetate of lime, etc. A. G. Peuchen, President and General Manager, and E. E. Tiffin, Secretary and Treasurer, Toronto; William Thomson, Vice President, Orillia, Ontario. (Formerly owned and operated by the Deseronto Iron Company, Limited; acquired by the present owners in November, 1908.)—*Active in 1908; being rebuilt.*

Hamilton Furnaces, The Hamilton Steel and Iron Company, Limited, Hamilton, Wentworth county. Two stacks: Furnace A, 75½ x 16, built in 1894-5 and blown in December 30, 1895, has one 75 x 19 Roberts and three 65 x 19 Gordon-Whitwell stoves, and Furnace B, 80 x 20, built in 1906-7 and blown in November 8, 1907, has three Roberts 2-pass stoves, each 90 x 21; fuel, Connellsville coke; ores, Lake Superior hematite and Ontario hematite and magnetic; product, foundry, malleable Bessemer, and basic pig iron; annual capacity, 175,000 tons. Brand, "Hamilton." Another Roberts 2-pass stove may be added to Furnace B.—*Both active in 1908. See Rolling Mills and Steel Works in this Province, pages 14-15.*

Midland Furnace No. 1, Canada Iron Furnace Company, Limited, Montreal. Furnace at Midland, Simcoe county. One stack, 64 x 13, built in 1900 and blown in December 4, 1900; three 2-pass fire-brick Cowper-Whitwell stoves, each 55 x 18; fuel, Connellsville coke; ores, Michipicoten and American Lake Superior, partly mined by the company; product, foundry, malleable Bessemer, and Bessemer pig iron; annual capacity, 45,000 tons. Brand, "Midland." Machine shops, boiler shops, and a gray iron foundry are connected with the furnace. John J. Drummond, General Superintendent, Midland.—*Active in 1908. See Canada Iron Furnace Company, Limited, in Quebec, page 8.*

ELECTRIC PLANTS—2.

Electro Metals, Limited, Welland, Welland county. Built in 1907 and first put in operation in November, 1907; equipped with furnaces for the manufacture by electricity of pig iron, 18 to 60 per cent. ferro-silicon, and other ferro-alloys. Electricity generated by water-power at Niagara Falls. R. H. Wolff, President; Robert Turnbull, Vice President; Walter Gaston, Secretary, Treasurer, and General Manager.—*Active in 1908.*

Lake Superior Power Company, Sault Ste. Marie, Algoma district.

Two experimental electric furnaces for the manufacture of pig iron and ferro-alloys; one furnace built in 1899 and first put in operation in February, 1899, and one furnace built in 1906 and first put in operation in April, 1906; ore, roasted nickeliferous pyrrhotite from the Sudbury district of Ontario; product, ferro-nickel, ferro-silicon, etc.; annual capacity, 1,000 tons of ferro-nickel pig iron or 250 tons of ferro-silicon. Electricity generated by water-power. Charles D. Warren, President; J. Tatnall Lea, Vice President; John T. Terry, Jr., Secretary-Treasurer; W. C. Franz, General Manager; E. A. Sjostedt, Chief Metallurgist. Controlled by the Lake Superior Corporation.—*Active in 1908.*

Number of furnaces in Ontario: 6 completed and 2 projected coke stacks and one rebuilding charcoal stack. In addition 2 plants make pig iron, ferro-silicon, etc., by electricity.

ROLLING MILLS AND STEEL WORKS—12.

Algoma (The) Steel Company, Limited, Sault Ste. Marie, Algoma district. Built in 1901-2 and first put in operation in February, 1902; two 6-gross-ton Bessemer steel converters, 3 Siemens regenerative gas heating furnaces, 3 reheating furnaces, three 4-hole soaking pits, 4 iron and 3 spiegel cupolas, one 150-gross-ton metal mixer, one 32-inch blooming mill, and one 23-inch combined rail and structural mill; first Bessemer steel made February 18, 1902, and first Bessemer blooms and first Bessemer steel rails rolled May 5, 1902; two 35-gross-ton basic stationary Wellman open-hearth steel furnaces added in 1906-7 and first open-hearth ingots made and first open-hearth steel rails rolled May 3, 1907; product, steel ingots, rails, and splice and angle bars; annual capacity, 200,000 tons of Bessemer ingots, 56,000 tons of open-hearth ingots, and 230,000 tons of rails and other finished rolled products. Steam and electric transmission from water-power. Fuel, bituminous coal for boilers and gas producers and coke for cupolas. Molten metal is taken in ladles from the blast furnaces to the metal mixer and thence conveyed in ladles to the Bessemer converters; molten metal is not used in the open-hearth steel furnaces. C. D. Warren, President, Traders Bank Building, Toronto, Ontario; J. Tatnall Lea, First Vice President, First National Bank, Philadelphia, Pa.; T. J. Drummond, Second Vice President, Canada Life Building, Montreal, Quebec; John T. Terry, Jr., Secretary and Treasurer, 100 Broadway, New York City; W. C. Franz, General Manager, J. S. Wynn, General Auditor, T. H. McGillivray, Purchasing Agent, and D. D. Lewis,

General Superintendent, Sault Ste. Marie, Ontario. Sole selling agents, Drummond, McCall & Co., Canada Life Building, Montreal, Quebec. Controlled by the Lake Superior Corporation.—*See Blast Furnaces in this Province, page 11.*

Belleville Iron and Horseshoe Company, Limited, Belleville, Hastings county. Built in 1899 and first put in operation in January, 1900; equipped with machinery from the dismantled plants of the Thames Iron Works, of Norwich, Conn., the Nashua Iron and Steel Company, of Nashua, N. H., and the Metropolitan Rolling Mills, of Montreal, Canada; 9 heating furnaces, 4 bolt furnaces, 3 trains of rolls, (one 9-inch, one 12-inch, and one 18-inch,) 2 hand-fed Copeland spike machines, 2 sets of horseshoe machines, 2 nut machines, 2 sets of bolt machines, 2 sets of bolt threaders, and one 6-spindle nut tapper; product, bar iron, bar steel, horseshoes, ship and railway spikes, track bolts, etc.; annual capacity, 12,000 gross tons of rolled products, about 50,000 kegs of spikes, and about 40,000 kegs of horseshoes. Fuel, coal. A machine shop and a blacksmith shop are connected with the works. (A cut-nail factory formerly connected with the works has been dismantled.) David Yuile, President, Montreal; D. S. Thornton, Secretary, Treasurer, and Purchasing Agent, and P. J. Smith, General Manager, Belleville. (Formerly operated by the Iron and Steel Company of Canada, Limited; later by the Toronto and Belleville Rolling Mills, Limited; acquired by the present company on July 1, 1908.)

Canada Tin Plate and Sheet Steel Company, Limited, Morrisburg, Dundas county. Built in 1906-7 and first products rolled December 17, 1907; 8 coal-fired heating furnaces, 8 black plate mills, (four 26-inch hot and four 22-inch cold,) one 20-ton electric crane, and 7 shears (4 doubling and 3 trimming); product, black plates for tinplates and terne plates, Canada plate steel sheets, galvanized plates, etc.; also makes tinplates; annual capacity, 12,500 tons of finished rolled products. Fuel, coal and oil. Electricity, generated by water-power, is also used. Brand, "Alcan." G. H. Meldrum, President, and N. D. Lewis, General Manager, Morrisburg; W. P. Bull, Secretary, and J. K. Brodie, Treasurer, Temple Building, Toronto. Selling agents, W. D'Oyley Hutchins, Sovereign Bank Building, Montreal, and Meldrum, Hobson & Co., Canada Life Building, Toronto.—*See Tinplate and Terne Plate Works in this Province, pages 17-18.*

Hamilton (The) Steel and Iron Company, Limited, Hamilton. Three mills in Wentworth county, two at Hamilton and one

at East Hamilton: Hamilton Mills, (two works,) built in 1861; 2 busheling furnaces, (one single and one double,) 4 double puddling furnaces, 9 coal heating furnaces, 5 trains of rolls, (one 14-inch muck, one 9-inch and one 10-inch guide, one 20-inch bar, and one 20-inch plate,) and 3 hammers (one 5-ton and one 2-ton upright and one helve); product, bar and band iron and steel, fish plates, and forgings; annual capacity, 44,000 tons of finished products. East Hamilton Mill, built in 1900; one continuous coal heating furnace, 2 trains of rolls, (one 10-inch and one 14-inch,) and 2 automatic spike machines; product, steel bars, railroad spikes, and washers; annual capacity, 25,000 tons of bars, 105,000 kegs of spikes, (200 pounds to the keg,) and 8,000 boxes of washers, (50 pounds to the box.) Open-hearth steel plant added to the East Hamilton Mill in 1900; now contains 4 basic furnaces (two 30-gross-ton and two 15-gross-ton); first steel made May 15, 1900; product, ingots and castings; annual capacity, 71,000 tons of ingots and 1,300 tons of castings. East Hamilton Mill is operated by steam-power and electricity. Fuel, bituminous coal and natural gas. Brand, "Hamilton." Machine shops for the use of the company are connected with the works. Charles S. Wilcox, President; Robert Hobson, Vice President and General Manager; H. H. Champ, Secretary and Treasurer; D. D. O'Connor, Sales Manager.—*See Hamilton Furnaces in this Province, page 12.*

Kennedy (The Wm.) & Sons, Limited, Owen Sound, Grey county. Built in 1899-1900 and put in operation in May, 1900; one 2-gross-ton Tropenas steel converter; product, machinery and other steel castings from 1 pound to 6,000 pounds; annual capacity, single turn, 400 tons. Fuel, coke. A gray iron foundry with an annual capacity of from 300 to 400 tons is connected with the works; also a machine shop. M. Kennedy, Sr., President and Manager; D. J. Kennedy, First Vice President; M. Kennedy, Jr., Second Vice President; Ewing Cameron, Secretary and Treasurer.

London Rolling Mill Company, Limited, London, Middlesex county. Built in 1902-3, utilizing a part of the machinery formerly in the plant of the Guelph Iron and Steel Company, Limited, at Guelph; first put in operation at London in March, 1903; one scrap furnace, 2 busheling furnaces, 2 heating furnaces, 3 trains of rolls, (one 18-inch muck, one 14-inch roughing, and one 10-inch finishing,) and one squeezer; product, merchant bar iron and steel, bolts, nuts, hinges, etc.; annual capacity, 15,000 tons of rolled products and 6,000 tons of bolts, nuts, hinges, etc. Fuel, bituminous coal. John White, President; J. Frank White,

Superintendent; Charles H. White, Manager. Selling agents, Baines & Peckover, Toronto, Ontario; Bissett & Loucks, Limited, Winnipeg, Manitoba.

Northern (The) Iron and Steel Company, Limited, Union Trust Company, Liquidators, Toronto. Works at Collingwood, Simcoe county. Built in 1901-3; two 20-gross-ton basic open-hearth steel furnaces with an annual capacity of 36,000 tons of ingots, 2 reverberatory ingot heating furnaces, and 2 trains of rolls (one 10-inch semi-continuous Belgian mill with 5 stands of rolls and one 18-inch three-high merchant bar mill with 3 stands of rolls); open-hearth steel not made down to December, 1908; first products rolled in September, 1906; product, billets, round, square, and flat bars, wire rods, angles, plow beams, wagon tires, shafting, girders, street rails, mine rails, bolts, rods, hoops, etc.; annual capacity, 30,000 tons. Fuel, coal. A machine shop is connected with the works. (Excavations made in 1902 at Collingwood for a 250-gross-ton coke blast furnace; work indefinitely suspended in 1903; abandoned.)—*Rolling Mill and Steel Plant idle and for sale.*

Ontario Iron and Steel Company, Limited, Traders Bank Building, Toronto. Branch offices: Montreal, Quebec; St. John, New Brunswick; Winnipeg, Manitoba; and Vancouver, British Columbia. Works at Welland, Welland county. Built in 1906-7; 3 heating furnaces, two 3-high trains of rolls, (one 12 and one 22-inch,) and 2 stationary basic open-hearth steel furnaces (one 20 and one 25-gross-ton); first open-hearth steel made August 15, 1907, and first products rolled in June, 1908; product, steel ingots, castings, billets, squares, rounds, flats, angles, channels, fish plates, and 12 to 25-lb. rails; annual capacity, 32,000 tons of steel ingots, 10,000 tons of steel castings, 30,000 tons of billets, and 28,000 tons of finished rolled products. Fuel, natural gas and bituminous coal. Electric power from Niagara Falls is also used. Brand, "N. F." in a diamond. One 50-gross-ton basic open-hearth steel furnace is projected. A machine shop is connected with the works. W. W. Near, President, General Manager, General Sales Manager, and Purchasing Agent, H. Rooke, Secretary and Treasurer, and Jenkins & Hardy, Auditors, Toronto, Ontario; D. H. Friedman, Vice President, Albany, New York.

Ottawa (The) Steel Casting Company, Limited, Ottawa, Carleton county. Built in 1904-5 and first put in operation in February, 1905; enlarged in 1907; 6 Hunter furnaces (three 3-ton, two 8-ton, and one 10-ton) and 3 cupolas; first steel castings made February 13, 1905, and first gray iron castings made in

February, 1902 ; product, machinery castings ; annual capacity, 1,500 tons of steel and 1,500 tons of iron castings. Fuel, coal. A machine shop is connected with the works. J. B. Maclaren, President and Manager ; E. S. Leetham, Vice President ; G. M. Maclaren, Secretary and Treasurer. Sales made by the company. Toronto Bolt and Forging Company, Limited, Toronto. Rolling mills at Sunnyside, Toronto. Built in 1893 and put in operation in the same year ; 3 coal heating furnaces, 2 double busheling furnaces, and 3 trains of rolls (one 12-inch roughing and one 9-inch and one 22-inch finishing) ; product, iron and steel merchant bars, bolt and nut bars, agricultural implement and carriage iron, etc. ; annual capacity, single turn, 8,000 tons. Fuel, bituminous coal from the United States. The company also operates works at Swansea and Gananoque, in the Province of Ontario, for the manufacture of bolts, nuts, spikes, rivets, carriage hardware, and drop forgings. George Gillies, President ; T. H. Watson, Vice President and Managing Director ; A. R. Gillies, Secretary-Treasurer ; John Stephens, General Superintendent ; C. O. Jolley, Assistant Superintendent.

ELECTRIC PLANTS—1.

American Electric Furnace Company, 45 Wall st., New York City. Works at Niagara Falls, Ontario, Canada. Built in 1907-8 ; 2 electric furnaces, one with a daily capacity of 3 gross tons and one with a daily capacity of 2,000 pounds ; the smaller furnace commenced operations on January 24, 1908, and the larger furnace on July 9, 1908 ; product, steel ingots and steel castings ; annual capacity, 1,200 tons. Electricity generated by water-power at Niagara Falls. Can also melt copper, brass, zinc, lead, nickel, aluminum, and other metals and alloys. J. Mitchell Clark, President ; J. Armstrong Rawlins, Vice President ; Edward Allen Colby, Second Vice President ; Arthur Her-ring, Secretary and Treasurer.

Number of rolling mills and steel works in Ontario : 12. Of these one makes Bessemer steel, one makes Tropenas steel, 4 can make open-hearth steel, and one makes steel by the Hunter process. In addition one plant makes steel ingots and castings and melts copper, brass, zinc, nickel, aluminum, etc., by electricity.

TINPLATE AND TERNE PLATE WORKS—1.

Canada Tin Plate and Sheet Steel Company, Limited, Morrisburg, Dundas county. Built in 1906-7 ; first tinplates made in December, 1907 ; practically destroyed by fire in that month and immediately rebuilt ; operations resumed May 25, 1908 ; 4

sets for tinplates and terne plates; terne plates not yet made but probably will be in 1909; weekly capacity, 2,500 boxes. Fuel, coal. Electric power is also used. Brand, "Alcan."—See *Rolling Mills and Steel Works in this Province for a list of officers and selling agents, page 14.*

Number of tinplate and terne plate works in Ontario: one.

MANITOBA.

ROLLING MILLS—1.

Manitoba Rolling Mill Company, Limited, Winnipeg. Branch office with the United States Horse Shoe Company, Erie, Pa. Construction commenced in the fall of 1904 by T. M. Kirkwood; plant acquired in December, 1906, by the Manitoba Rolling Mill Company, Limited; completed in 1907 and first put in operation June 27, 1907; 2 heating furnaces, one forge fire, and 2 trains of rolls (one 9-inch with 5 stands and one 16-inch with 2 stands); product, merchant bar iron; annual capacity, 12,000 tons. Fuel, coal. May add 2 busheling furnaces and a squeezer in 1909. A machine shop for the use of the company is connected with the works. L. A. McElroy, President and General Manager, and J. S. Curtis, Treasurer, Erie, Pa.; T. M. Kirkwood, Vice President, Toronto, Ontario; B. S. Fletcher, Secretary, Buffalo, N. Y.; T. H. Webb, Auditor, and F. Ziegahn, Resident Manager and Purchasing Agent, Winnipeg.

Number of rolling mills in Manitoba: one. There are no blast furnaces or steel works in this Province.

SUMMARY.

Number of blast furnaces in Canada in December, 1908: 15 completed, one rebuilding, and 2 projected. Of the completed furnaces 12 use coke and 3 use charcoal. The furnace being rebuilt will use charcoal and the 2 projected furnaces will use coke. In addition one abandoned coke furnace is still standing. There are also 2 plants which make pig iron, ferro-silicon, etc., by electricity. Annual capacity of the completed and rebuilding furnaces, 1,005,000 gross tons of coke pig iron and 34,800 tons of charcoal pig iron: total, 1,039,800 tons. In addition the 2 electric plants have an annual capacity of about 2,500 tons.

Number of blast furnaces in Canada in December, 1904: 16 completed and 3 projected. Of the completed furnaces 11 used coke and 5 used charcoal for fuel. Annual capacity of the completed furnaces, 755,000 gross tons of coke pig iron and 75,000 tons of charcoal pig iron: total, 830,000 tons.

Number of rolling mills and steel works in Canada in December, 1908: 26 completed and one to be rebuilt. Of these one has a standard Bessemer steel plant with 2 converters, one has a plant with an idle modified Bessemer converter, one has a Tropenas plant with one converter, and one has 2 standard Bessemer converters which are used for desiliconizing and decarburizing molten metal for open-hearth furnaces; 7 plants have 24 basic open-hearth steel furnaces, one plant has 2 acid open-hearth steel furnaces, one plant is to rebuild a basic open-hearth furnace, and one existing open-hearth plant may add one basic furnace; one plant has 6 furnaces for making steel by the Hunter process, and one plant with 2 furnaces makes steel by electricity. Annual capacity of completed plants and plants to be rebuilt, on double turn: Standard Bessemer and Tropenas steel ingots and castings, not including the idle modified Bessemer converter or the 2 standard Bessemer converters which are used for desiliconizing and decarburizing molten metal for open-hearth furnaces, 200,800 gross tons; basic open-hearth steel ingots and castings, 690,300 tons; acid open-hearth castings, 12,000 tons; Hunter steel castings, 1,500 tons; and electric steel ingots and castings, 1,200 tons: total steel ingots and castings, 905,800 tons; total finished rolled and forged products, not including muck bars, billets, blooms, sheet bars, etc., 1,004,600 tons.

Number of rolling mills and steel works in Canada in December, 1904: 18 completed, 3 building, and 2 projected. Of these one made Bessemer steel, one had an idle modified Bessemer steel converter, one made Tropenas steel, 5 made open-hearth steel, and one open-hearth steel plant and one plant for the manufacture of steel by the Hunter process were being built. Annual capacity of built and building plants on double turn: Standard Bessemer and Tropenas steel ingots and castings, not including the idle modified Bessemer converter, 200,800 gross tons; open-hearth steel ingots and castings, 451,000 tons; and Hunter steel castings, 1,500 tons: total steel ingots and castings, 653,300 tons; total finished rolled and forged products, not including muck bars, billets, blooms, sheet bars, etc., 839,600 tons.

Number of tinsplate and terne plate works in Canada in December 1908: one. Weekly capacity, 2,500 boxes.

Number of tinsplate and terne plate works in Canada in December 1904: none.



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