DIRECTORY

TO THE

IRON AND STEEL WORKS

OF

THE UNITED STATES.

EMBRACING A FULL DESCRIPTION OF THE BLAST FURNACES, ROLLING MILLS, STEEL WORKS, TINPLATE AND TERNE PLATE WORKS, AND FORGES AND BLOOMARIES IN THE UNITED STATES; ALSO CLASSIFIED LISTS OF THE WIRE ROD MILLS, THE STRUCTURAL MILLS, PLATE, SHEET, AND SKELP MILLS, BLACK PLATE MILLS, RAIL MILLS, STEEL CASTING WORKS, BESSEMER STEEL WORKS, OPEN HEARTH STEEL WORKS, AND CRUCIBLE STEEL WORKS.

COMPILED AND PUBLISHED BY

THE AMERICAN IRON AND STEEL ASSOCIATION.

SIXTEENTH EDITION. CORRECTED TO AUGUST 1, 1904.

PHILADELPHIA:
THE AMERICAN IRON AND STEEL ASSOCIATION,
No. 261 South Fourth Street.
1904.

Printed by
ALLEN, LANE & SCOTT,
Nos. 1211-1213 Clover Street,
Philadelphia.

CONTENTS.

PARTICULAR attention is called to Part IV—Latest Information—which will be found beginning on page 441. It brings all desirable information down to August 1, 1904.

The names of iron and steel and other firms and companies mentioned in the Directory will be found alphabetically arranged in the Index, which begins on page 451. Also the names of all iron and steel works, including tinplate and terne plate works; also the names of brands of pig iron.

PART I—CHIEFLY CONSOLIDATIONS.

PART II—BY STATES AND DISTRICTS.

PART II—BY STATES AND DISTRICTS.—CONTINUED.

LONG INACTIVE, ABANDONED, OR DISMANTLED IRON AND STEEL WORKS.

PART III—CLASSIFIED BY PRODUCTS.

PART IV—LATEST INFORMATION.

Corrected to August 1, 1904.

PREFACE TO THE SIXTEENTH 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, and forges and bloomaries in the United States, the information contained in this edition of the Directory being brought down to the latest possible date prior to its publication. The general plan of compilation adopted in the preparation of the Directory for 1901 has been followed in the present edition, but it will be found upon examination of the present volume that the inquiries submitted to the manufacturers have been even more searching and more comprehensive than were then submitted. 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, but this feature has been enlarged in the present edition. The alphabetical arrangement of previous editions is retained. A comprehensive table of contents and a most complete index will be appreciated by all who will have occasion to consult this edition of the Directory. With two unimportant exceptions every line of information contained in these pages has been obtained directly from the manufacturers and is given publicity by their authority.

Part I of the present edition, occupying 188 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, through lack of information or from other causes, were included in Part II of the 1901 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, and steel works. All the properties of the United States Shipbuilding Company are

described. Many changes in the ownership as well as in the equipment of plants described in Part I and Part II of the Directory for 1901 will be noticed in the present edition, further consolidations of ownership being a particularly noticeable feature.

Part II, occupying 186 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, as in the edition for 1901, blast furnaces coming first, followed by rolling mills and steel works and forges and bloomaries. Part II also contains a list of recently abandoned or dismantled iron and steel works and of long inactive plants.

Part III, occupying 66 pages, classifies for ready reference the leading products of the rolling mills and steel works, the arrangement being by States. It includes the Bessemer steel works, the open-hearth steel works, the crucible steel works, the steel casting works, the rail mills, the structural mills, the wire-rod mills, the skelp mills, the plate and sheet mills, the black plate mills, and the tinplate and terne plate works.

This edition of the Directory, which embraces exactly 484 pages, including the index, and which forms a larger volume than any of its predecessors, does not contain some classified lists of minor iron and steel products and of iron and steel consumers that may be found in previous editions. These omitted lists will all be found in the Supplement to the Directory for 1901 which was issued in 1903.

Part IV, occupying 28 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.

The opinion has been frequently expressed that the organization in the iron trade in recent years of many so-called "trusts," particularly of the United States Steel Corporation, would result in a serious check to individual enterprise or to the enlistment of comparatively small firms and companies in the manufacture of iron and steel. An examination of the present edition of the Directory will show that apparently precisely the opposite effect has been produced, or at least that the "trusts" have not interfered with the growth of our iron and steel industries under independent auspices. A surprisingly large number of independent iron and steel plants have been built in the last few years, while many old and well established companies have greatly increased their facilities in these years for the manufacture of iron and steel. Espe-

cially has there been a marked development of independent enterprise in the manufacture of iron and steel specialties, of which steel castings may be mentioned as a leading example.

Whole Number of Blast Furnaces.—In the edition of the Directory for 1901 we described 406 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 24,800,000 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 428 completed furnaces, either active or reported to us as likely to be some day active. Eliminating some of the furnaces in the latter category as being in our opinion dead for all time there remain about 410 live furnaces to-day. The annual capacity of these furnaces we place in round numbers at 27,675,000 gross tons. Our actual production of pig iron in 1903 was 18,009,252 gross tons. Since 1901 we have transferred 21 furnaces to the abandoned, dismantled, or inactive list.

Furnaces Building.—When the Directory for 1901 appeared 12 furnaces were being built, namely, 2 in New York, 1 in New Jersey, 3 in Pennsylvania, 1 in West Virginia, 2 in Alabama, 1 in Michigan, and 2 in Colorado. In the present edition we enumerate 17 furnaces in course of erection or as 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 figures for both years we do not include projected furnaces or furnaces that had been undertaken and work upon which had been suspended.

Fuel Used in Blast Furnaces.—The 406 furnaces described in the edition for 1901 were classified as follows: 55 used charcoal as fuel, 5 used mixed charcoal and coke, and 346 used anthracite and bituminous fuel. Of the 428 furnaces that are now described 56 use charcoal and 372 use anthracite and bituminous fuel. No furnaces now use mixed charcoal and coke. Five furnaces, not included above, make ferro-silicon, ferro-chrome, ferro-tungsten, etc., by electricity.

Capacity of Furnaces According to Fuel Used.—The average annual capacity of the 55 charcoal and 5 mixed charcoal and coke furnaces in 1901 was 14,179 gross tons, and the average annual capacity of the 56 charcoal furnaces that are now described is 15,207 tons. The average annual capacity of the mineral fuel furnaces in 1901 was 69,252 tons; in June, 1904, it is 73,286 tons.

Rolling Mills and Steel Works.—In the edition of the Directory for 1901 we enumerated 527 completed rolling mills and steel works, 28 in course of erection, 1 being rebuilt, 1 to be rebuilt, and 6 projected. In the present edition we enumerate 572 completed rolling

mills and steel works, 12 in course of erection, 1 being rebuilt, and 2 partly erected. In addition the Directory mentions 14 projected plants. The annual capacity of the completed rolling mills in 1904 amounts to 25,978,050 tons of finished rolled products, as compared with 23,220,350 tons in 1901.

Puddling Furnaces.—The number of puddling furnaces in November, 1901, each double furnace counting as two single furnaces, was 3,251. In June, 1904, there were 3,161 puddling furnaces. The highest number of puddling furnaces reported in any edition of the Directory was in 1884, when 5,265 were enumerated.

Bessemer Steel Works.—The total number of completed Bessemer steel works in November, 1901, including 1 Clapp-Griffiths plant, 2 Robert-Bessemer plants, and 9 Tropenas and "special" Bessemer plants, was 47, and the whole number of converters was 100. In June, 1904, there were 32 standard Bessemer steel works 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 make steel by special processes: total number of Bessemer plants, 51: total number of converters, 103. The increase in the number of small Bessemer plants in the last few years is noteworthy. Since November, 1901, 6 standard Bessemer plants with 15 converters have been dismantled. In addition 2 Tropenas plants with 3 converters have been abandoned. The annual capacity of the completed and building Bessemer converters in November, 1901, was 12,998,700 gross tons; in June, 1904, it was 13,628,600 tons, an increase of 629,900 tons. No basic-Bessemer steel is made.

Open Hearth Steel Works.—The Directory for 1901 described 112 completed open-hearth steel plants, with 403 completed furnaces. In the present Directory we describe 135 completed plants, with 549 completed furnaces. In 1901 12 open-hearth plants with 40 furnaces were building, 1 plant was to be rebuilt, 13 plants were projected, and 6 furnaces were being added to existing plants. 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 1 open-hearth steel plant which has 4 completed furnaces had 3 furnaces which were partly erected several years ago, but upon which work had been indefinitely suspended. The annual capacity of the 549 completed and the 28 building and partly erected open-hearth furnaces, in ingots and direct castings, in June, 1904, was 11,335,100 gross tons, against an annual capacity in November, 1901, of 8,289,750 tons, showing an increase of 3,045,350 tons.

Growth of Basic Steel.—In the Directory we indicate the character of the product made at our open-hearth steel works, whether acid or basic steel, or both. Of the 403 completed furnaces in November, 1901, 236 were prepared to make basic steel and 167 to make acid steel, and of the 46 building furnaces 33 would make basic steel and 13 acid steel. The completed and building basic furnaces had an annual capacity of 6,415,100 tons and the acid furnaces of 1,874,650 tons. In the present Directory 185 open-hearth furnaces are described as making acid steel and 364 as making basic steel; also 4 acid and 24 basic furnaces as being built or as partly erected: total, 189 acid and 388 basic furnaces. The acid furnaces have an annual capacity of 2,015,900 gross tons of ingots and castings, and the basic furnaces of 9,319,200 tons.

Crucible Steel Works.—In November, 1901, there were 45 completed crucible steel plants, equipped with 2,896 pots, and their aggregate capacity was 175,000 tons. In June, 1904, there were 57 completed plants, the number of pots was 3,606, and the aggregate annual capacity of the plants was 226,610 tons.

Steel Castings.—In 1901 there were 56 open-hearth steel plants which were prepared to make steel castings, and in June, 1904, there were 84 plants. The production of open-hearth steel castings has greatly increased since 1898. As already mentioned, the number of small Bessemer plants has also increased since 1901, all of which make steel castings. Steel castings are also made by 26 crucible plants; also by a few plants which use special processes.

Rail Mills.—In the edition of the Directory for 1901 we enumerated 45 rolling mills which were prepared to make standard, girder, light T, and other iron and steel rails, and 3 mills as in course of erection. In the present edition we enumerate 44 completed rail mills, 1 building, and 1 projected.

Structural Mills.—The whole number of works which are now equipped to roll beams, beam girders, zee bars, tees, channels, angles, bridge rods, building rods, plates for bridge work, structural tubing, etc., is 70, as compared with 67 in November, 1901.

Plate and Sheet Mills.—In the Directory for 1901 we enumerated 153 completed plate and sheet mills, 7 building, and 1 projected. In the present Directory we enumerate 157 completed mills, 2 building, 1 partly erected, and 4 projected.

Iron and Steel Skelp Mills.—In the Directory for 1901 we enumerated 60 completed iron and steel skelp mills and 2 building. We now enumerate 61 completed mills and 2 projected.

Black Plate Mills.—In the Directory for 1901 we enumerated 46 completed black plate plants, 6 building, and 1 projected. In the present Directory we mention 49 completed and 3 building plants.

Tinplate and Terne Plate Works.—In November, 1901, there were 55 completed tinplate and terne plate works, 7 building, and 1 projected. In the present Directory we enumerate 53 completed works, 2 building, and 1 projected.

Wire Rods.—In November, 1901, we enumerated 32 completed wire-rod mills, 4 building, 1 rebuilding, and 1 projected. In June, 1904, there were 33 mills equipped to roll iron and steel wire rods.

Cut Nail Works.—In November, 1901, there were 32 rolling mills which were devoted in whole or in part to the manufacture of cut nails and cut spikes, containing 3,161 nail and spike machines. In June, 1904, there were 23 rolling mills which made cut nails and cut spikes, equipped with 2,302 nail and spike machines. These were located in 8 States, as follows: Massachusetts, 3; Pennsylvania, 8; Virginia, 1; West Virginia, 3; Kentucky, 1; Ohio, 4; Illinois, 2; and California, 1. In addition 1 cut-nail works was being built in Indiana, to be equipped with 102 cut-nail machines. The cut-nail works are fully described in the Supplement to the Directory for 1901, published in 1903.

Wire Nail Works.—For a full description of the wire-nail works see the Supplement to the Directory for 1901, published in 1903.

Natural Gas.—In the Directory for 1901 we enumerated 110 completed iron and steel works which used natural gas and 7 in course of erection. In June, 1904, the total number of works which used natural gas was 135, and in addition 2 works to use natural gas were being erected, 1 works was partly erected, 1 works was rebuilding, and 2 works were projected, as follows: 54 completed in Allegheny county and 33 completed and 1 projected in other parts of Western Pennsylvania; West Virginia, 11 completed and 2 building; Kentucky, 1; Ohio, 19 completed, 1 partly erected, and 1 projected; Indiana, 16 completed and 1 rebuilding; and Illinois, 1.

Forges and Bloomaries.—The number of pig and scrap iron bloomaries which made blooms, billets, etc., for sale in November, 1901, was 8, nearly all of which were active in that year. The number of forges which made blooms directly from the ore was 2. The number of bloomaries now enumerated is 8 completed and 1 building. The number of forges which make blooms directly from the ore is reduced to 1, located in New York.

Canada.—In the edition for 1901 there was presented a complete description of the iron and steel works of Canada. As there have since been few and comparatively unimportant additions to these works it has not been thought necessary to revise for the present volume the Canadian information given in the Directory for 1901.

J. M. S.

No. 261 South Fourth Street, Philadelphia, August 1, 1904.

SUMMARY BY STATES.

BLAST FURNACES.

States.	Completed Furnaces, June 1, 1904.				Annual Capacity of Completed Furnaces, June 1, 1904, in gross tons.			
	Anthracite.*	Bituminous.	Charcoal.	Total.	Anthracite.*	Bituminous.	Charcoal.	Total—Gross tons.
Massachusetts,	....	....	2	2	.....	.....	9,000	9,000
Connecticut,	....	....	3	3	.....	.....	15,000	15,000
New York,	8	10	4	22	390,000	1,040,000	90,000	1,520,000
New Jersey,	7	5	....	12	151,000	395,000	.....	546,000
Pennsylvania,	61	89	5	155	2,478,900	8,731,000	15,300	11,225,200
Maryland,	....	5	1	6	.....	415,000	6,000	421,000
Virginia,	....	22	4	26	.....	857,000	33,500	890,500
West Virginia,	....	4	....	4	.....	425,000	.....	425,000
Kentucky,	....	8	....	8	.....	235,000	.....	235,000
Tennessee,	....	19	3	22	.....	787,000	26,600	813,600
North Carolina,	....	1	....	1	.....	35,000	.....	35,000
Georgia,	....	1	3	4	.....	72,000	51,500	123,500
Alabama,	....	43	6	49	.....	2,724,500	94,500	2,819,000
Texas,	....	....	4	4	.....	.....	72,500	72,500
Ohio,	....	54	7	61	.....	5,226,000	30,700	5,256,700
Illinois,	....	22	....	22	.....	2,275,000	.....	2,275,000
Michigan,	....	1	10	11	.....	90,000	304,000	394,000
Wisconsin,	....	5	1	6	.....	310,000	45,000	355,000
Minnesota,	....	1	....	1	.....	80,000	.....	80,000
Missouri,	....	1	1	2	.....	45,000	25,000	70,000
Colorado,	....	5	....	5	.....	500,000	.....	500,000
Washington,	....	....	1	1	.....	.....	18,000	18,000
Oregon,	....	....	1	1	.....	.....	15,000	15,000
Total,	76	296	56	428	3,019,900	24,242,500	851,600	28,114,000

* Includes 5 furnaces which use anthracite coal alone for fuel and 71 furnaces which use anthracite coal and coke mixed.

In addition to the furnaces enumerated above 2 furnaces in Virginia and 3 furnaces in West Virginia were equipped for the production by electricity of ferro-chrome, ferro-silicon, ferro-tungsten, and other ferro alloys.

On June 1, 1904, there were 17 furnaces in course of erection or being rebuilt, located in the following States: New York, 3 bituminous; Pennsylvania, 5 bituminous; Virginia, 1 bituminous; Alabama, 2 bituminous; Ohio, 4 bituminous; Michigan, 1 charcoal; and Colorado, 1 bituminous: total, 16 bituminous and 1 charcoal. In addition there were 8 furnaces which were projected, one of which was partly built and work on it indefinitely suspended, located in the following States: New Jersey, 1 anthracite alone; Pennsylvania, 1 anthracite and coke (partly erected); Alabama, 3 bituminous; Ohio, 1 bituminous; Missouri, 1 bituminous; and Utah, 1 charcoal and coke mixed.

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.	Steel Works.						Tinplate and Terne Plate Works.	Forges and Bloomaries.
				Bessemer.	Clapp-Griffiths.	Robert-Bessemer.	Tropenas and Special Bessemer.	Open-hearth.	Crucible.		
Maine,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Massachusetts,	13	7	260	.....	1	.....	1	4	4	.....	....
Rhode Island,	4	3	.....	.....	.....	.....	1	1	.....	.....	....
Connecticut,	9	6	.....	.....	.....	.....	.....	3	2	.....	....
New York,	26	21	.....	2	.....	.....	1	8	4	2	2
New Jersey,	23	20	.....	.....	.....	.....	2	5	5	.....	....
Pennsylvania,	248	214	759	12	.....	.....	3	67	29	26	6
Delaware,	7	6	.....	.....	.....	.....	.....	2	.....	.....	....
Maryland,	6	6	.....	1	.....	.....	.....	1	.....	2	1
Dist. of Columbia,	1	.....	.....	.....	.....	.....	1	.....	.....	.....	....
Virginia,	6	5	137	1	.....	.....	1	.....	.....	1	....
West Virginia,	16	15	353	2	.....	.....	.....	1	.....	5	....
Kentucky,	10	10	126	1	.....	.....	.....	1	.....	1	....
Tennessee,	2	1	.....	.....	.....	.....	.....	1	1	.....	....
Georgia,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Alabama,	13	11	.....	1	.....	.....	.....	5	.....	.....	....
Ohio,	82	73	526	7	.....	1	.....	16	1	8	....
Indiana,	36	29	.....	.....	.....	.....	.....	6	1	4	....
Illinois,	30	24	126	3	.....	.....	1	8	2	2	....
Michigan,	5	4	.....	.....	.....	1	.....	.....	.....	1	....
Wisconsin,	14	4	.....	1	.....	.....	2	3	8	.....	....
Minnesota,	2	1	.....	.....	.....	.....	1	.....	.....	.....	....
Missouri,	5	4	.....	.....	.....	.....	.....	1	.....	1	....
Kansas,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Colorado,	2	2	.....	1	.....	.....	.....	1	.....	.....	....
Wyoming,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Washington,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Oregon,	2	1	.....	.....	.....	.....	1	.....	.....	.....	....
California,	5	3	15	.....	.....	.....	1	1	.....	.....	....
Total,	572	475	2,302	32	1	2	16	135	57	53	9

* Excludes all steel works that do not contain hot trains of rolls.

On June 1, 1904, there were 12 rolling mills and steel works being erected in the United States, as follows: New York, 1; Pennsylvania, 2; Delaware, 1; West Virginia, 2; Alabama, 1; Ohio, 1; Indiana, 3; and Washington, 1. In addition 1 plant in Delaware was being rebuilt, and 1 plant in Pennsylvania and 1 plant in Ohio were partly erected but work upon their construction indefinitely suspended. Fourteen rolling mills and steel works were also projected, as follows: New York, 1; New Jersey, 1; Pennsylvania, 2; West Virginia, 1; Ohio, 3; Indiana, 1; Illinois, 1; Michigan, 1; Colorado, 1; Washington, 1; and California, 1.

On the same date 2 tinplate and terne plate works were being erected, as follows: West Virginia, 1, and Colorado, 1. In addition 1 plant for the manufacture of tinplates and terne plates was projected in Indiana.

One forge to manufacture charcoal blooms, slabs, and billets for its own consumption and for sale was being built on June 1, 1904.

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 castings, in gross tons.
	Number of completed works.	Annual capacity of finished rolled products.	Number of converters.	Annual capacity of ingots and castings.	Number of furnaces.	Annual capacity of ingots and castings.	Number of completed works.	Annual capacity of ingots and castings.	
Maine,	1	30,000	.....	.....	.....	.....	.....	.....	.....
Mass.,	7	255,100	2	31,200	14	214,000	4	1,750	246,950
Rhode Island,	3	78,000	2	2,500	2	20,000	.....	.....	22,500
Connecticut,	6	177,500	.....	.....	6	87,000	2	2,400	89,400
New York,	21	1,416,500	8	1,046,500	20	407,800	4	13,780	1,468,080
New Jersey,	20	584,300	5	7,500	15	215,000	5	28,200	250,700
Pennsylvania,	214	12,548,700	35	5,392,000	354	7,272,900	29	170,205	12,835,105
Delaware,	6	83,600	2	3,000	8	170,000	.....	.....	173,000
Maryland,	6	515,000	3	500,000	2	35,000	.....	.....	535,000
Dist. of Col.,	.....	.....	1	300	.....	.....	.....	.....	300
Virginia,	5	172,700	3	61,000	.....	.....	.....	.....	61,000
West Virginia,	15	634,300	4	340,000	3	24,000	.....	.....	364,000
Kentucky,	10	260,800	2	150,000	7	96,000	.....	.....	246,000
Tennessee,	1	50,000	.....	.....	1	500	1	300	800
Georgia,	1	20,000	.....	.....	.....	.....	.....	.....	.....
Alabama,	11	653,000	**1	.....	19	531,100	.....	.....	531,100
Ohio,	73	3,981,250	15	3,302,400	55	959,900	1	450	4,262,750
Indiana,	29	1,055,900	.....	.....	14	203,500	1	100	203,600
Illinois,	24	2,080,000	10	2,088,000	42	841,000	2	3,500	2,932,500
Michigan,	4	97,000	2	5,000	.....	.....	.....	.....	5,000
Wisconsin,	4	329,000	5	95,000	3	9,400	8	5,925	110,325
Minnesota,	1	25,000	1	1,000	.....	.....	.....	.....	1,000
Missouri,	4	114,000	.....	.....	5	40,000	.....	.....	40,000
Kansas,	1	100,000	.....	.....	.....	.....	.....	.....	.....
Colorado,	2	610,000	2	600,000	6	200,000	.....	.....	800,000
Wyoming,	1	18,000	.....	.....	.....	.....	.....	.....	.....
Washington,	1	24,000	.....	.....	.....	.....	.....	.....	.....
Oregon,	1	6,000	1	1,200	.....	.....	.....	.....	1,200
California,	3	58,400	1	2,000	1	8,000	.....	.....	10,000
Total,	475	25,978,050	‖105	13,628,600	‡577	11,335,100	57	226,610	25,190,310

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

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

‖ Includes 75 completed standard Bessemer steel converters with an annual capacity of 13,551,000 tons of ingots and castings, 1 Clapp-Griffiths converter with an annual capacity of 30,000 tons; 3 top-blown converters with an annual capacity of 2,500 tons, 14 Tropenas converters with an annual capacity of 20,500 tons, 2 Evans-Wills converters with an annual capacity of 5,000 tons, 1 completed and 2 building Bookwalter converters with an annual capacity of 6,000 tons, 3 Robert-Bessemer converters with an annual capacity of 7,400 tons, and 4 special converters with an annual capacity of 6,200 tons.

‡ Includes 189 completed, building, and partly erected acid open-hearth steel furnaces with an annual capacity of 2,015,900 gross tons of ingots and castings and 388 basic furnaces with an annual capacity of 9,319,200 tons of ingots and castings.

** Converter used for desiliconizing and decarburizing molten metal for the open-hearth furnaces of the Tennessee Coal, Iron, and Railroad Company.

GRAND SUMMARY.

NUMBER AND CAPACITY OF IRON AND STEEL WORKS.	June, 1904.	November, 1901.
Number of completed Blast Furnaces—296 Bituminous, 71 Anthracite and Coke, 5 Anthracite alone, and 56 Charcoal: total,	428	406
Number of Electric Furnaces,	5	.....
Number of Blast Furnaces building and rebuilding,	17	12
Annual capacity of completed Blast Furnaces, gross tons,	28,114,000	24,812,037
Annual capacity of the Bituminous Furnaces, gross tons,	24,242,500	20,771,200
Annual capacity of the Anthracite and Anthracite and Coke Furnaces, gross tons,	3,019,900	3,190,087
Annual capacity of the Charcoal Furnaces, gross tons,	851,600	706,750
Annual capacity of the mixed Charcoal and Coke Furnaces,	.....	144,000
Number of Completed Rolling Mills and Steel Works,	572	527
Number of Rolling Mills and Steel Works building and rebuilding,	13	29
Number of Single Puddling Furnaces, (a double furnace counting as two single furnaces,)	3,161	3,251
Number of Heating Furnaces,	3,995	3,723
Annual capacity in finished products of completed Rolling Mills, double turn, (omitting all forged products,)	25,978,050	23,220,350
Number of Cut-nail Works connected with rolling mills,	23	32
Number of Cut-nail Machines,	2,302	3,161
Number of completed standard Bessemer Steel Works,	32	35
Number of standard Bessemer Converters,	75	81
Annual capacity of these Converters (built and building) in ingots and direct castings, gross tons,	13,551,000	12,938,000
Number of completed Clapp-Griffiths Steel Works,	1	1
Number of completed Clapp-Griffiths Converters,	1	1
Number of completed Robert-Bessemer Steel Works,	2	2
Number of completed Robert-Bessemer Converters,	3	3
Number of completed Tropenas and Special Bessemer Steel Works,	16	9
Number of completed Tropenas and Special Bessemer Converters,	24	15
Annual capacity of all kinds of Bessemer Converters (built and building) in ingots and direct castings, gross tons,	13,628,600	12,998,700
Number of completed Open-Hearth Steel Works,	135	112
Number of Open-Hearth Steel Works building,	5	12
Number of Open-Hearth Steel Furnaces—549 completed, 22 building, and 6 partly built,	549	403
Annual capacity of these Furnaces (built, building, and partly erected) in ingots and direct castings, gross tons,	11,335,100	8,289,750
Number of completed Crucible Steel Works,	57	45
Number of building Crucible Steel Works,	.....	3
Number of Steel-melting Pots in completed works,	3,606	2,896
Annual capacity of Pots in ingots and direct castings,	226,610	175,000
Number of completed Tinplate and Terne Plate Works,	53	55
Number of Tinplate and Terne Plate Works building,	2	7
Number of Forges making wrought iron from ore,	1	2
Annual capacity in blooms, double turn, gross tons,	6,000	6,075
Number of completed pig and scrap iron Bloomaries,	8	8
Number of building pig and scrap iron Bloomaries,	1	.....
Annual capacity in blooms of completed and building pig and scrap iron Bloomaries, double turn, gross tons,	41,300	25,575

THE IRON AND STEEL WORKS

OF

THE UNITED STATES.

PART I—CHIEFLY CONSOLIDATIONS.

THE UNITED STATES STEEL CORPORATION.

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

The United States Steel Corporation; business office, Empire Building, New York. *Directors—term expires in 1905:* Marshall Field, Daniel G. Reid, John D. Rockefeller, Jr., W. E. Corey, Robert Bacon, Nathaniel Thayer, John F. Dryden, and Clement A. Griscom; *term expires in 1906:* Robert Winsor, Charles Steele, William H. Moore, Norman B. Ream, Peter A. B. Widener, James H. Reed, Henry C. Frick, and William Edenborn; *term expires in 1907:* J. Pierpont Morgan, Henry Phipps, Henry H. Rogers, Charles M. Schwab, Elbert H. Gary, George W. Perkins, Edmund C. Converse, and James Gayley. *Finance Committee:* George W. Perkins, Chairman; Henry H. Rogers, Norman B. Ream, Peter A. B. Widener, Henry C. Frick, Robert Bacon, Henry Phipps, W. E. Corey, ex-officio, and Elbert H. Gary, ex-officio. *Advisory Committee:* W. E. Corey, Chairman; Edmund C. Converse, William Edenborn, and Daniel G. Reid.

Officers at New York: Elbert H. Gary, Chairman of Board of Directors; W. E. Corey, President; James Gayley, First Vice-President; William B. Dickson, Second Vice-President; Francis Lynde Stetson, General Counsel; Richard Trimble, Secretary and Treasurer; and William J. Filbert, Comptroller.

Transfer Agent: Hudson Trust Company, 51 Newark street, Hoboken, New Jersey, and 71 Broadway, New York. *Registrars of Stock:* For preferred stock, New York Security and Trust Company, New York; for common stock, Guaranty Trust Company, New York. General offices of the United States Steel Corporation, 51 Newark street, Hoboken, New Jersey.

Meetings.—The annual meeting of the stockholders is held on the third Monday of April. The regular meeting of the Board of Directors is held on the third Tuesday of 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, 1903, $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, $298,319,000 of 5 per cent. 50-year and $152,902,500 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 in that year 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 and one-sixth of the stock of the Oliver Iron Mining Company; the remaining five-sixths of the stock of both companies is owned by the Carnegie Steel Company (of New Jersey.)

Complete details concerning the officials, properties, equipment, products, etc., of the above companies will be found in the following pages, including the vessels owned and operated by the Pittsburgh Steamship Company, the properties owned or controlled by the Oliver Iron Mining Company, the coke works operated by the H. C. Frick Coke Company, and the coal mines, natural gas properties, railroads, etc., owned or operated by the subsidiary companies of the United States Steel Corporation.

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 office 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 books of the Carnegie Steel Company (of New Jersey).

Capital stock of the company, $63,000,000, all common.

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

Board of Directors: James H. Reed, Chairman; A. C. Dinkey, W. E. Corey, H. P. Bope, W. W. Blackburn, W. C. McCausland, Charles M. Schwab, D. M. Clemson, William H. Singer, E. H. Gary, D. G. Kerr, and Thomas Murray.

General Superintendents: A. R. Hunt, Homestead Steel Works, Howard Axle Works, and Carrie Furnaces; H. D. Williams, Duquesne Steel Works and Duquesne Furnaces; Charles E. Dinkey, Edgar Thomson Steel Works and Edgar Thomson Furnaces; L. T. Brown, Upper and Lower Union Mills (Pa.); James Scott, Lucy Furnaces and Isabella Furnaces; L. T. Brown, Clark Mill, Painter Mill, and McCutcheon Mill; I. W. Jenks, General Manager of the hoop and cotton-tie mills of the Monessen Mill, Girard Mill, Greenville Mill, Warren Mill, Upper and Lower Union Mills, (Ohio,) and Duncansville Mill; Thomas McDonald, General Superintendent of the Ohio Steel Works, Ohio Furnaces, and Niles Furnace; W. J. Root, Columbus Steel Works, Columbus Furnaces, and Zanesville Furnace; John Reis, New Castle Steel Works,

New Castle Furnaces, Sharon Steel Works, Sharon Furnaces, South Sharon Steel Works, and South Sharon Furnaces; N. M. Petersen, Bellaire Steel Works and Bellaire Furnaces and Mingo Steel Works and Mingo Furnaces; and Niven McConnell, Donora Steel Works and Donora Furnaces.

Sales Agencies: Atlanta, Ga., Equitable Building, 45 North Pryer st.; Boston, Telephone Building, 125 Milk st.; Buffalo, German Insurance Building, 451 Main st.; Chicago, The Rookery, 217 La Salle st.; Cincinnati, Union Trust Building, Fourth and Walnut sts.; Cleveland, Perry-Payne Building, 103 Superior st.; Denver, Boston Building, Seventeenth and Champa sts.; Detroit, Union Trust Building, 102 Griswold st.; New Orleans, Hennen Building, Carondelet and Common sts.; New York, Empire Building, 71 Broadway; Philadelphia, Harrison Building, Fifteenth and Market sts.; Portland, Oregon, Ainsworth Building, 73½ Third st.; San Francisco, Boyd Building, 226 Market st.; Seattle, Washington, Mutual Life Building; St. Louis, National Bank of Commerce Building, Olive st.; St. Paul, Pioneer Press Building, Robert and Fourth sts.; and Washington, D. C., National Safe Deposit Building, 1429 New York ave.

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, N. Y.

Plants Operated: The Carnegie Steel Company (of New Jersey), in addition to the plants which were formerly known as belonging to 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 plant of the Union Steel Company, and it has also completed and will operate what are known as the Donora Steel Works and Donora Furnaces of the Union Steel Company, at Donora, Pa., including the blast furnaces, open-hearth steel furnaces, and blooming mill.

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

Trotter Water Company, the Youghiogheny Northern Railway Company, the Youghiogheny Water Company, the Union Supply Company, the Chapin Mining Company, and the Winthrop Iron 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 Oliver Iron Mining Company and the Pittsburgh Steamship Company, 75 per cent. of the capital stock of the Pittsburgh Limestone Company, Limited, 74$\frac{4}{15}$ per cent. of the capital stock of the H. C. Frick Coke Company, 25 per cent. of the capital stock of the Biwabic Mining Company, 66$\frac{2}{3}$ per cent. of the capital stock of the Columbus Stone 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., & 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, and two-thirds of the capital stock of the National Mining Company.

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

BLAST FURNACES—43 ACTIVE, 1 IDLE, 3 BUILDING, AND 1 REBUILDING.

Bellaire Furnaces, Bellaire, Belmont county, Ohio. Two stacks: one, 75 x 17, built in 1873, blown in September 22, 1873, and rebuilt in 1886; and one, 75 x 18, 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. (Formerly called the Bellaire Works and operated by the National Steel Company.)—*Active in 1903.*

Carrie Furnaces, Rankin, Allegheny county, Pa. Five stacks, two of which were built by the Carrie Furnace Company and three by the Carnegie Steel Company. No. 1, 93 x 19½, was 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. 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 No. 5, 90 x 21. Molten metal from these furnaces is shipped direct to the Homestead Steel Works. Fuel, Connellsville coke; ore, Lake Superior; product, basic pig iron; total annual capacity, 710,000 tons. Equipped with 3 Heyl & Patterson pig-iron casting machines. (Formerly operated by the Carnegie Steel Company.)—*Active in 1903.*

Columbus Furnaces, Columbus, Franklin county, Ohio. Two stacks: one, 75 x 17½, completed in November, 1873, and rebuilt in 1892, 1895, and 1900, has three Massicks & Crooke stoves, each 65 x 18; and one, 80 x 18, built in 1897 and first blown in August 12, 1897, has three Massicks & Crooke stoves, each 75 x 19½; fuel, Pocahontas and New River coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 180,000 tons. (Formerly called the Columbus Works and operated by the National Steel Company.)—*Active in 1903.*

Donora Furnaces, Donora, Washington county, Pa. Two stacks, Nos. 1 and 2, each 85 x 22, built in 1902–4; neither of these furnaces was blown in down to April 30, 1904; four Kennedy stoves, each 100 x 24; fuel, Connellsville coke; ore, Lake Superior; product, basic open-hearth pig iron; estimated total annual capacity, 365,000 tons. Equipped with two Heyl & Patterson pig-iron casting machines. (The furnaces were partly built by the Union Steel Company and were completed by the Carnegie Steel Company (of New Jersey); they are owned by the Union Steel Company.)—*Not blown in down to April 30, 1904.* *See page 21.*

Duquesne Furnaces, Cochran, (post office address, Duquesne,) Allegheny county, Pa. Four 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. Molten metal from these furnaces is used in the Duquesne Steel Works. 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. (Formerly operated by the Carnegie Steel Company.)—*Active in 1903.*

Edgar Thomson Furnaces, Bessemer, (post office address, Braddock,) Allegheny county, Pennsylvania. Eleven stacks, four built by the Edgar Thomson Steel Company, Limited, five by Carnegie Brothers & Co., Limited, and two by the Carnegie Steel Company (of Pennsylvania.) Furnace A, 80 x 15½, has four fire-brick stoves, each 65 x 15, and one fire-brick stove 75 x 18; Furnaces

B, 81 x 19½, and C, 85 x 21, have eight fire-brick stoves, six 75 x 20 and two 75 x 21; Furnaces D and E, each 90 x 22, have eight fire-brick stoves, four 78 x 21 and four 90 x 21; Furnaces F, 90 x 21, and G, 90 x 22, have seven fire-brick stoves, each 90 x 21; Furnaces H, 91 x 22, and I, 90 x 20, have seven fire-brick stoves, each 90 x 21; and Furnaces J and K, each 90 x 22, have eight fire-brick stoves, each 98 x 21. Furnaces C and H rebuilt in 1903. 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. Molten metal from these furnaces is used in the Edgar Thomson Steel Works. Fuel, Connellsville coke; ores, Lake Superior and foreign; product, Bessemer and basic pig iron and spiegeleisen and ferromanganese; total annual capacity, 1,460,000 gross tons. Equipped with six Uehling pig-iron casting machines. (Formerly operated by the Carnegie Steel Company.)—*Active in 1903.*

Isabella Furnaces, Etna, Allegheny county, Pa. Three stacks, two built in 1872 and one built in 1890; No. 1, 90 x 21, rebuilt in 1902, has four Kennedy stoves, each 90 x 21; No. 2, 90 x 19, rebuilt in 1900, has four Kennedy stoves; this furnace was out of blast in December, 1903; 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; total annual capacity of furnaces Nos. 1 and 3, 290,000 tons. Brand, "Isabella." Equipped with one pig-iron casting machine. (Formerly operated by the Isabella Furnace Company, Incorporated, which was owned by the American Steel Hoop Company.)—*Active in 1903.*

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. (Formerly operated by the Carnegie Steel Company.)—*Active in 1903.*

Mingo Furnaces, Mingo Junction, Jefferson county, Ohio. Three stacks: No. 1, (formerly known as No. 2,) 75 x 17, built in 1872 and rebuilt in 1886; four Gordon-Whitwell-Cowper stoves. 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 first blown in April 28, 1901; four Massicks & Crooke stoves, each 85 x 21. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 425,000 tons. Equipped with one pig-iron casting machine. (Formerly called the Mingo Works and operated by the National Steel Company.)—*Active in 1903.*

New Castle Furnaces, New Castle, Pa. Four stacks, (two completed, one rebuilding, and one building.) Furnace No. 1, (formerly called Rosena,) 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 18 x 65 and one 85 x 21. Furnace No. 2, (formerly called Neshannock,) dismantled in 1903; a modern furnace, 94½ x 20, is being erected on the site of the old stack; will be equipped with four Massicks & Crooke stoves, each 85 x 21; will be completed about July 15, 1904. Furnace No. 3, (formerly called Shenango,) dismantled in 1903; now being replaced by a new No. 3 furnace, 94½ x 20; will be equipped with four Massicks & Crooke stoves, each 85 x 20; will be completed about May 15, 1904. Furnace No. 4, 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. Annual capacities: No. 1, (completed,) 150,000 tons; No. 2, (rebuilding,) 160,000 tons; No. 3, (building,) 160,000 tons; and No. 4, (completed,) 160,000 tons: total, 630,000 tons. Equipped with two Heyl & Patterson pig-iron casting machines. (The furnaces were formerly called the New Castle Works and were operated by the National Steel Company.)—*Four furnaces active in 1903.*

Niles Furnace, Niles, Ohio. One stack, 76 x 18¼; 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. (Formerly called the Niles Works and operated by the National Steel Company.)—*Active in 1903.*

Ohio Furnaces, Youngstown, Ohio. Three completed stacks and one stack building. Completed stacks are each 106½ x 23, and building stack is 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; No. 3 is being remodeled and its size changed from 106½ x 23 to 90 x 23. No. 4, (building,) will be equipped with four Cowper-Kennedy-Roberts stoves, each 118 x 21. First blasts: No. 1,

February 15, 1900; No. 2, June 7, 1900; and No. 3, March 29, 1901; No. 4 will probably be ready for blast in June, 1904. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity of the completed furnaces, 600,000 tons; of the building furnace, 200,000 tons: total, 800,000 tons. Equipped with two pig-iron casting machines. (Formerly called the Ohio Works and operated by the National Steel Company.)—*Three furnaces active in 1903; one building.*

Sharon Furnace, Sharon, Pa. One stack, 75 x 11, built in 1866 and rebuilt in 1883; one Kennedy and three Whitwell stoves; fuel, coke; ore, Lake Superior; specialty, basic open-hearth pig iron; annual capacity, 91,000 tons. (One alternate stack, built in 1865, dismantled in 1901. Formerly called the Sharon Works and operated by the National Steel Company.)—*Active in 1903.*

South Sharon Furnaces, Sharon, Pa. Three stacks, two completed and one building: No. 1, (completed,) 100 x 22, built in 1900–1 and blown in in September, 1901; No. 2 (completed) and No. 3, (building,) each 85 x 19, built in 1902–4; No. 2 not blown in down to April 30, 1904; No. 3 to be blown in later; No. 1 has four Cowper-Kennedy stoves, each 100 x 22, and Nos. 2 and 3 have each four Cowper-Kennedy stoves, each 90 x 21. Fuel, coke; ore, Lake Superior; product, basic pig iron; total annual capacity of the completed furnaces, 320,000 tons; of the building furnace, 120,000 tons: total, 440,000 tons. Equipped with two single strand Heyl & Patterson pig-iron casting machines. (Furnace No. 1 was built and formerly operated by the Sharon Steel Company; it was also operated later by the National Steel Company. Furnaces Nos. 2 and 3 were partly built by the Sharon Steel Company and the National Steel Company; No. 2 was completed and No. 3 is being completed by the Carnegie Steel Company (of New Jersey). Owned by the Union Steel Company.)—*No. 1 active in 1903; No. 2 not blown in down to April 30, 1904; and No. 3 (building) to be blown in later.* *See pages 21–2.*

Zanesville Furnace, Zanesville, Muskingum county, Ohio. One stack, 75 x 16, built in 1870–1, blown in September 7, 1871, and rebuilt in 1883; three Whitwell stoves, each 65 x 17, and one Kennedy stove, 70 x 18; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 65,000 tons. (Formerly called the Zanesville Works and operated by the National Steel Company.)—*Active in 1903.*

Total annual capacity of the 43 completed active furnaces, not including idle Isabella No. 2, 6,146,000 tons of pig iron, spiegeleisen, and ferromanganese; of the 3 building furnaces, 480,000 tons; and of the rebuilding furnace, 160,000 tons: total, 6,786,000 tons.

ROLLING MILLS AND STEEL WORKS—24.

Bellaire Steel Works, Bellaire, Belmont county, 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 five driven roller and chain transfer tables. Bessemer steel works built in 1883–4 and rebuilt in 1897; two 10-gross-ton converters, 3 soaking pits, and one 32-inch blooming mill; first blow made April 28, 1884; annual capacity, 300,000 tons of ingots. Product, soft steel blooms, billets, slabs, and sheet and tinplate bars; annual capacity, 285,000 tons. Fuel, coal and manufactured gas. (Formerly called the Bellaire Works and operated by the National Steel Company.)

Clark Mill, Thirty-fifth street, A. V. Railway, and Allegheny river, Pittsburgh, Pa. 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, steel tire, and skelp; annual capacity, 60,000 tons. Fuel, natural and manufactured gas. Brands, "Delta" for cotton-ties and "*Ashco*" for other products. (Two 12-gross-ton acid open-hearth steel furnaces built in 1889–90 dismantled in 1901. Works formerly operated by the American Steel Hoop Company.)

Columbus Steel Works, Columbus, Franklin county, Ohio. Built in 1894–5 and put in operation May 2, 1895; two 4½-gross-ton Bessemer steel converters with an annual capacity of 200,000 tons, 2 soaking pits, 2 heating furnaces, and 3 trains of rolls (one 32-inch reversing blooming, one 20-inch sheet bar, and one 24-inch small billet); product, steel slabs, billets, and sheet bars; annual capacity, 160,000 tons. Fuel, coal and producer gas. (Formerly called the Columbus Works and operated by the National Steel Company.)

Donora Steel Works, Donora, Washington county, Pa. Built in 1902–3; twelve 50-gross-ton Siemens basic open-hearth steel furnaces with an annual capacity of 300,000 tons of ingots, four 4-hole soaking pits, and one 40-inch blooming mill; product, billets, blooms, and slabs; annual capacity, 240,000 tons. Fuel, natural gas. (Owned by the Union Steel Company.)—*Not put in operation down to April 30, 1904; time of starting indefinite.—See page 22.*

Duncansville Mill, Duncansville, Blair county, Pa. Built in 1839 and rebuilt in 1882–3; enlarged in 1890 and 1897; 37 single puddling furnaces, 3 coal and 2 gas heating furnaces, and 6 trains of rolls (one 18 and one 20-inch muck, one 15-inch bar, and one 7, one 8, and one 10-inch guide); product, merchant bars; annual capacity, 30,000 tons. Fuel, producer gas and coal. Brands,

"Portage" and "*Ashco.*" (Formerly called the Portage Mill and operated by the American Steel Hoop Company.)—*Idle and may be dismantled.*

Duquesne Steel Works, Cochran, (post office address, Duquesne,) Allegheny county, Pa. Built in 1886–8 by the Allegheny Bessemer Steel Company and capacity increased in 1891–2 by Carnegie Brothers & Co., Limited; 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, and 8 trains of rolls, (one 10, one 13, one 16, two 21, one 26, one 38, and one 40-inch,) and one bar reel; product, billets, blooms, slabs, sheet bars, splice bars, and merchant bars; annual capacity, 600,000 tons of Bessemer steel ingots, 480,000 tons of open-hearth steel ingots, and 820,000 tons of finished products. Fuel, natural gas and coal. (Formerly operated by the Carnegie Steel Company.)

Edgar Thomson Steel Works, Bessemer, (post office address, Braddock,) Allegheny county, Pa. Built in 1873–5 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 on August 26, 1875, and first steel rail rolled on September 1, 1875; four 15-gross-ton Bessemer steel converters, 4 spiegel cupolas, one 50-ton metal mixer, (molten Bessemer pig iron is taken from the Edgar Thomson Furnaces to the metal mixer and thence to the converting mill in ladles,) 7 pit furnaces, (32 holes,) 7 Siemens heating furnaces, one 3-high 40-inch blooming and two 3-high rail trains (one 23-inch and one 27-inch); equipment for finishing rails at a low temperature, hot saws, and finishing machinery; iron and brass foundries; a forge connected with the works contains one 6-ton hammer and 2 heating furnaces. Product, Bessemer steel rails, billets, sheet bars, and iron and brass castings; annual capacity, 1,000,000 tons of steel ingots, 650,000 tons of steel rails, billets, and sheet bars, and 50,000 tons of iron and brass castings. Fuel, natural gas. (Formerly operated by the Carnegie Steel Company.)

Girard Mill, Girard, Trumbull county, Ohio. Built in 1872 and put in operation September 1, 1873; 23 single and 2 double puddling furnaces, 3 regenerative gas heating furnaces, and 4 trains of rolls (20-inch muck and 7, 8, and 10-inch finishing); product, all sizes of iron and steel bars, small steel T rails, angles, channels, tees, and special shapes; special attention given to the manufacture of iron for chains, bolts, nuts, and agricultural imple-

ments; annual capacity, 35,000 tons. Fuel, manufactured gas for heating furnaces and coal for puddling furnaces. Brand, "*Ashco.*" (Formerly operated by the American Steel Hoop Company.)

Greenville Mill, Greenville, Mercer county, Pa. Built in 1871; 30 single puddling and 4 heating furnaces and 3 trains of rolls (one 16-inch muck and one 8 and one 10-inch finishing); product, iron and steel bars and skelp; special attention given to cold pressed nut iron; annual capacity, 25,000 tons. Brand, "*Ashco.*" Fuel, coal. (Formerly operated by the American Steel Hoop Company.)

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 in December, 1886; 7 furnaces completed in October, 1886; 1 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; and 2 in December, 1902. Two 10-gross-ton Bessemer steel converters and fifty basic open-hearth steel furnaces (three 20, twenty-three 40, and twenty-four 45-gross-ton); one 200-gross-ton mixing furnace; 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 train for structural shapes; one 119-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; 104 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, armor plates, and open-hearth steel castings; annual capacity, 425,000 tons of Bessemer steel ingots, 1,550,000 tons of basic open-hearth steel ingots, and 1,425,000 tons of rolled products. Finishing capacity of armor-plate department, 10,000 tons

per annum. Fuel, coal, coke, and natural gas. (Formerly operated by the Carnegie Steel Company.)

Howard Axle Works, Homestead, Allegheny county, 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, 130,000 tons. Fuel, coal. (Formerly operated by the Carnegie Steel Company.)

Lower Union Mill, Youngstown, Ohio. Built in 1863, 1874, and 1890; 10 single and 18 double puddling furnaces, 9 heating furnaces, (4 using producer gas,) and 9 trains of rolls (two muck, and one 7, three 8, two 10, and one 16-inch finishing); product, hoops, bands, horseshoe iron, bar iron, guide iron, shapes, merchant steel bars, and steel cotton-ties; annual capacity, 125,000 tons. Fuel, coal and manufactured gas. Brands, "Eagle" for horseshoe iron and "*Ashco*" for other products. (Formerly operated by the American Steel Hoop Company.)

Lower Union Mills, Twenty-ninth st., 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 78-inch,) 6 forge fires, and 6 hammers, (400 to 8,000 pounds,) and 4 spring pointing machines; product, sheared plates, forgings, and bar steel; annual capacity, 90,000 tons of rolled and 1,200 tons of forged products. Fuel, natural gas, coal, and oil. (Formerly operated by the Carnegie Steel Company.)

McCutcheon Mill, 88 Rebecca st., Allegheny, Pa. Built in 1862; 20 single puddling and 4 heating furnaces and 4 trains of rolls (one muck and two 8 and one 10-inch finishing); product, hoops, bands, horseshoe bars, cotton-ties, and light angles; also strap and T hinges, wrought steel shelf brackets, and wrought steel and iron washers; annual capacity, 95,000 tons. Fuel, natural gas and coal. Brands, "Star" for horseshoe bars and "*Ashco*" for other products. (Formerly operated by the American Steel Hoop Company.)

Mingo Steel Works, Mingo Junction, Jefferson county, 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. The Mingo Works were built in 1885–6 and first put in

operation in February, 1886. The present plant contains two 10-gross-ton Bessemer steel converters with an annual capacity of 450,000 tons of ingots; first blow made February 8, 1886; one 50-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, blooms, billets, slabs, sheet and tinplate bars, and steel merchant bars; annual capacity, 750,000 tons of partly finished products and 60,000 tons of merchant bars. Fuel, coal and producer gas. Brand for merchant bars, "*Ashco*." Molten pig iron is taken from the Mingo Furnaces to the converters.

Monessen Mill, Monessen, Westmoreland county, Pa. Built in 1898–9 and first put in operation March 24, 1899; 2 continuous charging gas heating furnaces and 2 trains of rolls (one 8 and one 10-inch); product, steel hoops, bands, and cotton-ties; annual capacity, 40,000 tons. Brand, "*Ashco*." Fuel, manufactured gas. (Formerly operated by the American Steel Hoop Company.)

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 10 tons in 1902; annual capacity, 600,000 tons of ingots; one 50-ton metal mixer, four 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, 550,000 tons. Fuel, coal and producer gas. Molten pig iron is taken from the New Castle Furnaces to the converters. (Formerly called the New Castle Works and operated by the National Steel Company.)

Ohio Steel Works, Youngstown, Ohio. Built in 1893–4; two 10-gross-ton Bessemer steel converters; first steel made February 4, 1895; one 50-ton metal mixer, six 4-hole soaking pits, 5 trains of rolls, (one 34-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, 700,000 tons of ingots, or 600,000 tons of rails, or 600,000 tons of billets and bars. Fuel, coal and producer gas. Molten pig iron is taken from the Ohio Furnaces to the converters. (Formerly called the Ohio Works and operated by the National Steel Company.)

Painter Mill, South Side, Pittsburgh, Pa. 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, cotton-ties, lock-steel, stone saws, merchant bands, skelp, and hinge steel; annual capacity, 110,000 tons. Fuel, natural gas, producer gas, and coal. Brand, "*Ashco*." (Formerly operated by the American Steel Hoop Company.)

Sharon Steel Works, Sharon, Pa. Built in 1896–7 and first put in operation in May, 1897; six 40-gross-ton basic open-hearth steel furnaces; first steel made May 24, 1897; annual capacity, 110,000 tons of ingots; three 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 bull-head mill; product, blooms and angles; annual capacity, 150,000 tons. Fuel, coal and producer gas. (Formerly called the Sharon Works and operated by the National Steel Company.)

South Sharon Works, Sharon, Pa. Built in 1900–1; twelve 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 350,000 tons of ingots; first steel made April 30, 1901; 4 soaking pits, one 36-inch blooming mill, one 30-inch universal mill, and three 26-inch bull-head mills; product, blooms, billets, and universal plates; annual capacity, 310,000 tons. Fuel, producer gas. Five additional 50-gross-ton basic open-hearth steel furnaces are projected. (Formerly operated by the Sharon Steel Company; later by the National Steel Company; now owned by the Union Steel Company.)—*See page 23.*

Upper Union Mill, Youngstown, Ohio. Built in 1871 and burned and rebuilt in 1877; 5 gas heating furnaces, and one 7 and one 8-inch continuous, one 10-inch continuous hoop, and one 12-inch finishing train of rolls; product, bar, hoop, band, hame, box, tongue-cap, and tire steel, angles, special shapes, and cotton-ties; annual capacity, 150,000 tons. Fuel, coal and manufactured gas. Brand, "*Ashco*." (Formerly operated by the American Steel Hoop Company.)

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; twenty-one 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, 230,000 tons, including 15,000 tons of columns, girders, and other fitted structural work. Fuel, natural gas and coal. (Formerly operated by the Carnegie Steel Company.)

Warren Mill, Warren, Trumbull county, Ohio. Built in 1870, burned in 1878, and rebuilt in 1879; 20 single and 4 double puddling

furnaces, 2 regenerative gas and 3 coal heating furnaces, and 3 trains of rolls (20-inch muck and 10 and 20-inch finishing); product, bar and skelp iron, shafting, etc.; annual capacity, 45,000 tons. Fuel, coal. Brand, "*Ashco*." (Formerly operated by the American Steel Hoop Company.)

Total annual capacity of the 24 rolling mills and steel works: 4,275,000 gross tons of Bessemer steel ingots, 2,790,000 tons of open-hearth steel ingots, 90,315 tons of iron, brass, and steel castings, moulds, stools, etc., 5,739,000 tons of blooms, billets, slabs, and sheet and tinplate bars, 1,145,000 tons of rails, 651,000 tons of plates, 130,000 tons of axles, 107,000 tons of muck iron, and 2,047,000 tons of hoops, bands, cotton-ties, skelp, merchant bars, shafting, and other forms of rolled and forged products.

CAR AND LOCOMOTIVE AXLE WORKS.

Howard Axle Works, Homestead, Allegheny county, Pa. Product, car and locomotive axles; annual capacity, 130,000 tons.

BOLT AND RIVET WORKS—2.

Homestead Steel Works, Munhall, Pa. Product, round, square, and hexagon bolts and buttons and cone-headed rivets. Sizes: bolts, from ⅜ of an inch to 3 inches; rivets, from ⅜ of an inch to 1 inch.

Upper Union Mills, Pittsburgh, Pa. Product, steel bolts and rivets. Sizes: bolts, from ½ of an inch to 1¼ inches in diameter and from 1½ inches to 24 inches long; rivets, from ⅜ of an inch to 1 inch in diameter and from 1½ inches to 6 inches long.

FOUNDRIES.

Bellaire Steel Works, Bellaire, Ohio. Product, brass castings for the use of the works; annual capacity, 15 tons.

Edgar Thomson Steel Works, Bessemer, Pa. Product, iron and brass castings for the company's use; annual capacity, 12,000 tons of castings and 75,000 tons of ingot moulds and stools.

Homestead Steel Works, Munhall, Pa. Product, open-hearth steel castings for the use of the works; annual capacity, 3,300 tons.

Total annual capacity: 15,315 gross tons of iron, brass, and steel castings and 75,000 tons of ingot moulds and stools.

THE CARNEGIE COMPANY.

The Carnegie Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Alva C. Dinkey, President; James H. Reed, Chairman of Board of Directors; H. P. Bope, First Vice-President and General Manager of Sales; W. W. Blackburn, Second Vice-President and Secretary; James J. Campbell, Auditor and

Assistant Secretary; W. C. McCausland, Treasurer; and W. R. Conrad, Assistant Treasurer.

This company was merged with the National Steel Company and the American Steel Hoop Company in March, 1903, under the name of the Carnegie Steel Company (of New Jersey).

CARNEGIE STEEL COMPANY (OF PENNSYLVANIA).

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

NATIONAL STEEL COMPANY.

The National Steel Company was merged in March, 1903, with the American Steel Hoop Company and the Carnegie Company under the name of the Carnegie Steel Company (of New Jersey).

AMERICAN STEEL HOOP COMPANY.

The American Steel Hoop Company was merged in March, 1903, with the National Steel Company and the Carnegie Company under the name of the Carnegie Steel Company (of New Jersey).

PROPERTY AT CONNEAUT, OHIO.

The Carnegie Steel Company owns 5,000 acres of land on the southern shore of 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:* James H. Reed, President; Daniel M. Clemson, Vice-President; G. W. Kepler, Secretary and Treasurer; D. Hum, Jr., Auditor; E. H. Utley, General Manager; O. J. Hammon, General Freight Agent; E. D. Comstock, General Passenger Agent; and J. S. Matson, Superintendent.

This company owns 8.87 and leases 204.03 miles of track (including 12.9 miles of leased track) between Conneaut Harbor, Ohio, Erie, Pa., and North Bessemer, Pa. Its equipment consists of 96 standard gauge locomotives, 47 passenger cars, 8,714 freight cars, and 218 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 J. D. DeCoursey, Auditor.

The Carnegie Natural Gas Company has under lease 115,000 acres of gas territory in Allegheny, Washington, Armstrong, and Westmoreland counties, Pennsylvania, and in Wetzel and Doddridge counties, West Virginia. The property includes 175 producing gas wells and 300 miles of main and branch pipe lines, supplying about 15,000,000,000 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 80–2.

OLIVER IRON MINING COMPANY.

Five-sixths of the 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 76–9.

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 72–6.

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.

This company operates the docks at the lake terminus of the Bessemer and Lake Erie Railroad Company, at Conneaut Harbor, Ohio, which have a daily capacity of 25,000 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; George E. McCague, Traffic Manager; William J. Post, Secretary and Auditor; and G. W. Kepler, Treasurer.

This company operates 86.39 miles of track, connecting the Monongahela river plants of the Carnegie Steel Company, and 19.73 miles of leased track between Bessemer and North Bessemer, Pa., equipped with 75 locomotives and 1,100 steel freight 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.

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

THE YOUGHIOGHENY NORTHERN RAILWAY COMPANY.

All the capital stock of the Youghiogheny Northern Railway Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 73.

YOUGHIOGHENY WATER COMPANY.

All the capital stock of the Youghiogheny Water Company is owned by the Carnegie Steel Company (of New Jersey). For further information concerning this company see page 73.

TROTTER WATER COMPANY.

All 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 pages 73–4.

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 74.

NATIONAL MINING COMPANY.

Two-thirds of the 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 this company see page 74.

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 pages 76–7.

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 page 77.

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 75.

NEW YORK, PENNSYLVANIA, AND OHIO DOCK COMPANY.

New York, Pennsylvania, and Ohio Dock Company; general offices, Cleveland, Ohio. *Officers:* H. G. Dalton, President and Treasurer; Harvey H. Brown, Vice-President; James H. Hoyt, Secretary; and Pickands, Mather & Co., Managers and Agents.

This company operates the docks at the lake terminus of the Erie Railroad at Cleveland, Ohio, which have a daily capacity of 12,000 tons of iron ore.

UNION SUPPLY COMPANY.

Union Supply Company; general offices, Carnegie Building, Pittsburgh, Pa. *Officers at Pittsburgh:* Thomas Lynch, President; J. W. Anawalt, Vice-President; William McWilliams, Secretary; and Philip Keller, Treasurer. *Officer at Uniontown, Pa.:* John Lynch, General Superintendent.

This company operates 40 stores and transacts a general merchandise business.

PENNSYLVANIA AND LAKE ERIE DOCK COMPANY.

Pennsylvania and Lake Erie Dock Company; general offices, Carnegie Building, Pittsburgh, Pa. *Officers at Pittsburgh:* ——— ———, President, and T. J. Crump, Secretary, Frick Building; D. G. Kerr, Vice-President and Treasurer, Carnegie Building. *Officer at Conneaut Harbor, Ohio:* R. R. Richardson, General Manager.

This company operates docks at the lake terminus of the Baltimore and Ohio Railroad, at Fairport Harbor, Ohio, which have a daily capacity of 14,500 tons of iron ore.

UNION STEEL COMPANY.

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

Union Steel Company; executive office, Empire Building, No. 71 Broadway, New York; Auditor's and Treasurer's office, Carnegie Building, Pittsburgh. *Officers:* W. B. Dickson, President; W. J. Filbert, Secretary; James J. Campbell, Auditor; 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, and the Donora Southern Railroad Company.

In addition it owns 60 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 the manufacturing plants named below, all of which are operated by constituent companies of the United States Steel Corporation.

BLAST FURNACES—4 COMPLETED AND 1 BUILDING.

Donora Furnaces, Donora, Washington county, Pa. (To be operated by the Carnegie Steel Company (of New Jersey.) Two stacks, Nos. 1 and 2, each 85 x 22, built in 1902–4; not blown in down to April 30, 1904; four Kennedy stoves, each 100 x 24; fuel, Connellsville coke; ore, Lake Superior; product, basic open-hearth pig iron; estimated total annual capacity, 365,000 tons. Equipped with two Heyl & Patterson pig-iron casting machines. (The furnaces were partly built by the Union Steel Company and were completed by the Carnegie Steel Company (of New Jersey.)—*See page 6.*

South Sharon Furnaces, Sharon, Pa. (Operated by the Carnegie Steel Company (of New Jersey.) Three stacks, two completed and one building: No. 1, (completed,) 100 x 22, built in 1900–1 and

blown in in September, 1901; No. 2 (completed) and No. 3, (building,) each 85 x 19, built in 1902–4; No. 2 not blown in down to April 30, 1904; No. 3 to be blown in later; No. 1 has four Cowper-Kennedy stoves, each 100 x 22; and Nos. 2 and 3 have each four Cowper-Kennedy stoves, each 90 x 21. Fuel, coke; ore, Lake Superior; product, basic pig iron; total annual capacity of the completed furnaces, 320,000 tons; of the building furnace, 120,000 tons: total, 440,000 tons. Equipped with two single strand Heyl & Patterson pig-iron casting machines. (Furnace No. 1 was built and formerly operated by the Sharon Steel Company; it was also operated later by the National Steel Company. Furnaces Nos. 2 and 3 were partly built by the Sharon Steel Company and the National Steel Company; No. 2 was completed and No. 3 is being completed by the Carnegie Steel Company (of New Jersey.)—*See page 9.*

Total annual capacity of the 4 completed furnaces, 685,000 gross tons; of the building furnace, 120,000 tons: total, 805,000 tons.

ROLLING MILLS AND STEEL WORKS—6.

Donora Steel Works, Donora, Washington county, Pa. (To be operated by the Carnegie Steel Company (of New Jersey.) Built in 1902–3; twelve 50-gross-ton Siemens basic open-hearth furnaces with an annual capacity of 300,000 tons of ingots, four 4-hole soaking pits, and one 40-inch blooming mill; product, billets, blooms, and slabs; annual capacity, 240,000 tons. Fuel, natural gas.—*Not put in operation down to April 30, 1904.*—*See page 10.*

Donora Works, Donora, Washington county, Pa. (Operated by the American Steel and Wire Company of New Jersey.) Built in 1900–1 and put in operation in September, 1901; 4 heating furnaces, one continuous and one right and one left hand Garrett finishing rod mills, 308 wire-drawing blocks, and 282 wire-nail machines; product, wire rods, bright and galvanized wire, barbed wire, wire nails, and staples; annual capacity, 200,000 tons of rods, 172,000 tons of wire, and 1,600,000 kegs of nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works. (Formerly operated by the Union Steel Company.)—*See page 43.*

Sharon Works, 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 made in August, 1901; 3 continuous heating furnaces, 2 reheating furnaces, one continuous billet mill, 2 continuous rod mills, one tinplate bar mill, 180 wire-drawing blocks, and 181 wire-nail machines; product, tinplate bars, wire rods, wire, wire nails, galvanized wire, barbed wire, and staples; annual capacity, 97,000 tons of tinplate bars,

105,000 tons of wire rods, 86,000 tons of wire, and 900,000 kegs of wire nails. Fuel, producer gas and coal. A galvanizing plant is connected with the works. (Formerly owned and operated by the Sharon Steel Company.)—*See pages 44-5.*

Sharon Works, 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-inch hot mills, and 15 sets of 22-inch cold mills; product, black plates for tinning; annual capacity, 45,000 tons. Fuel, manufactured gas and coal. Make tinplates. (Formerly operated by the Sharon Tin Plate Company; later by the American Tin Plate Company.)—*See pages 59-60.*

Sharon Works, Sharon, Pa. (Controlled by the American Sheet and Tin Plate Company.) Built in 1901-3; not yet put in operation; 10 pair and 10 sheet furnaces, 3 double annealing furnaces, 10 hot sheet mills, (one 28 x 48, one 28 x 42, and eight 28 x 38-inch,) and 6 cold mills (two 22 x 54 and four 22 x 48-inch); product, black sheets; annual capacity, 30,000 net tons. Fuel, coal and producer gas. (Partly built by the Sharon Sheet Steel Company; completed by the Union Steel Company.)—*See page 59.*

South Sharon Works, 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 350,000 tons of ingots; first steel made April 30, 1901; 4 soaking pits, one 36-inch blooming mill, one 30-inch universal mill, and three 26-inch bull-head mills; product, blooms, billets, and universal plates; annual capacity, 310,000 tons. Fuel, producer gas. Five additional 50-gross-ton basic open-hearth steel furnaces are projected. (Formerly operated by the Sharon Steel Company; later by the National Steel Company.)—*See page 15.*

Total annual capacity of the 6 works: 650,000 gross tons of open-hearth steel ingots, 550,000 gross tons of slabs, blooms, and billets, 97,000 gross tons of tinplate bars, 45,000 gross tons of black plates for tinning, 30,000 net tons of black sheets, 75,000 gross tons of universal plates, 305,000 gross tons of wire rods, 258,000 gross tons of wire, and 2,500,000 kegs of wire nails.

TINPLATE WORKS.

Sharon Works, Sharon, Pa. (Operated by the American Sheet and Tin Plate Company.) Built in 1900-1 and first tinplates made in July, 1901; 24 sets; weekly capacity, 18,000 boxes of tinplates. Fuel, coal. Make black plates. (Formerly operated by the Sharon Tin Plate Company; later by the American Tin Plate Company.)—*See page 63.*

WIRE AND WIRE-NAIL WORKS.

Donora Works, Donora, Pa. (Operated by the American Steel and Wire Company of New Jersey.) Product, wire rods, plain, galvanized, and barbed wire, staples, and all sizes of wire nails. Annual capacity, 200,000 tons of rods, 172,000 tons of wire, and 1,600,000 kegs of nails. Wire department: number of wire-drawing blocks, 308; sizes of wire drawn, from $\frac{5}{8}$ of an inch to $\frac{1}{32}$ of an inch. Wire-nail department: number of machines, 282; sizes, from 2-penny spike to 2-penny nail. (Formerly operated by the Union Steel Company.)—*See page 47.*

Sharon Works, Sharon, Pa. (Operated by the American Steel and Wire Company of New Jersey.) Product, wire rods, plain wire, barbed wire, wire nails, galvanized staples, etc. Annual capacity, 105,000 tons of rods, 86,000 tons of wire, and 900,000 kegs of nails. Wire department: number of wire-drawing blocks, 180; sizes, from $\frac{5}{8}$ of an inch to No. 22 gauge. Wire-nail department: number of machines, 181; sizes, from 3-penny fine to 60-penny. (Formerly operated by the Sharon Steel Company.)—*See page 49.*

Total annual capacity of the 2 works: 305,000 tons of rods, 258,000 tons of wire, and 2,500,000 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, 4; product, fence wire; annual capacity, 67,500 tons. (Formerly operated by the Union Steel Company.)—*See page 50.*

Sharon Works, Sharon, Pa. (Operated by the American Steel and Wire Company of New Jersey.) Number of galvanizing pans, 3; product, fence wire; annual capacity, 28,000 tons. (Formerly operated by the Sharon Steel Company.)—*See page 51.*

Total annual capacity of the 2 works: 95,500 tons.

WROUGHT-STEEL PIPE WORKS.

Sharon Tube Works, Sharon, Pa. (Controlled by the National Tube Company.) Equipped to produce wrought-steel pipe; sizes, from $\frac{1}{8}$ of an inch to 12 inches, outside diameter; annual capacity, 100,000 tons. (Formerly owned by the Sharon Steel Company.) —*Never in operation and not likely to be operated on its present site.*—*See page 37.*

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, in St. Louis county, Minnesota. All its capital stock is owned by the Union Steel Company. For further information concerning this company see page 77.

RIVER COAL COMPANY.

This company owns 1,500 acres of coal lands in Fayette county, Pa., the development of which has just been commenced. All its capital stock is owned by the Union Steel Company. For further information concerning this company see page 74.

DONORA MINING COMPANY.

This company owns the Penobscot, the Sweeney, and the Donora iron-ore mines in the Mesabi Range, in St. Louis county, Minn., and the Volunteer iron-ore mine in the Marquette Range, in Marquette county, Mich. In addition it owns about 1,900 acres of iron-ore lands in the Marquette Range, in Marquette county. Its capital stock is owned by the Union Steel Company. For further information concerning this company see page 77.

SHARON COAL AND LIMESTONE COMPANY.

The Sharon Coal and Limestone Company owns 7,157 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 this company see pages 74–5.

SHARON COKE COMPANY.

The Sharon Coke Company owns 1,458 acres of coking coal lands at Masontown, Fayette county, Pa., and has 212 completed Otto-Hoffman retort ovens with a daily capacity of about 1,200 tons of coke. Its capital stock is all owned by the Union Steel Company. For further information concerning this company see page 75.

REPUBLIC COKE COMPANY.

This company owns 3,222 acres of undeveloped coal land and 511 acres of surface land in Fayette county, Pa. Its capital stock is all owned by the Union Steel Company. For further information concerning this company see page 75.

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 National Tube Company, (of Ohio,) the Lorain Steel Company, the Minnesota Iron Company, and the Elgin, Joliet, and Eastern Railroad Company.

THE ILLINOIS STEEL COMPANY.

The Illinois Steel Company; general offices, Rookery Building, Chicago. *Officers:* E. J. Buffington, President; T. W. Robinson, First Vice-President; C. H. McCullough, Jr., Second Vice-President; T. J. Hyman, Secretary and Treasurer; L. D. Doty, Purchasing Agent; George Baker, General Manager of Sales; and E. M. Hagar, Manager of Cement Department. *Officers at the Works:* North Works—W. H. Pratt, General Superintendent, and L. J. Miller, Auditor; South Works—W. A. Field, General Superintendent, and J. F. Wilson, Auditor; Joliet Works—D. R. Mathias, General Superintendent, and L. W. McNamee, Auditor; Milwaukee Works—R. B. Charlton, General Superintendent, and C. H. Hosler, Auditor.

Sales Department: Chicago—George Baker, General Manager of Sales. Boston—Wilbur Sargent Locke, Manager, and William Fred Hickey, Assistant Manager, 125 Milk st. New York—Charles W. Baker, Manager, and C. C. Cluff, Assistant Manager, Empire Building. Philadelphia—James B. Bonner, Manager, Harrison Building. Buffalo—T. Guilford Smith, Manager, German Insurance Building. Cleveland—James R. Mills, Jr., Manager, Perry-Payne Building. Cincinnati—W. H. D. Totten, Jr., Manager, Union Trust Building. Atlanta, Ga.—Walter M. Kelley, Manager, Equitable Building. New Orleans—John R. Scott, Manager, Hennen Building. Detroit—N. D. Carpenter, Manager, Union Trust Building. St. Paul—George A. McDougall, Manager, Pioneer Press Building. St. Louis—W. J. Totten, Manager, New Bank of Commerce Build-

ing. Denver—Edward M. Sparhawk, Manager, Boston Building. San Francisco—William B. Isaacs, Manager, 226 Market st. Montreal, Canada—Charles Cassils, Manager, Bell Telephone Building. Mexico—F. W. Highberger, Manager, 924 Apartado. St. Louis—J. C. Van Doorn, Agent Cement Department, 324 Odd Fellows' Building. Portland, Oregon—Richard R. Hoge, Manager, Ainsworth Building.

Capital stock, $18,650,600, all common. The Illinois Steel Company operates the following works:

BLAST FURNACES—19 ACTIVE AND 1 IDLE.

Joliet Works, Joliet, Illinois. Four stacks, three active and one idle: Nos. 1 and 2, each 78½ x 19½; old No. 3, (idle,) 78½ x 19 5/12; and new No. 3, 80 x 20. Nos. 1 and 2 built in 1873 and rebuilt in 1891, old No. 3 built in 1889–90, and new No. 3 built in 1903; the stoves, blowing engines, etc., of old No. 3 were used in equipping new No. 3; if the old furnace is rebuilt it will be known as No. 4; four Siemens-Cowper-Foote, four Massicks & Crooke, and four Whitwell-Gordon stoves; fuel, Connellsville and Pocahontas Flat-Top coke; ores, Lake Superior and Northern ranges; product, Bessemer pig iron; total annual capacity, not including old No. 3, 395,000 tons. One Heyl & Patterson pig-iron casting machine. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

Milwaukee Works, Bay View Furnaces, Milwaukee, Wisconsin. Two stacks, Nos. 1 and 2, each 66 x 16, built in 1870–1; 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." Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

North Works, Chicago, Illinois. Furnaces at the foot of Wabansia avenue, on the north branch of the Chicago river. Two stacks, Nos. 1 and 2, each 66 x 16, built in 1869; engine and boiler equipment sufficient to operate only one furnace at a time; four fire-brick stoves of various types; fuel, Connellsville and Pocahontas coke; ores, Lake Superior, Gogebic, Western, and foreign; product, chiefly spiegeleisen and basic open-hearth and foundry pig iron; total annual capacity, 60,000 tons. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

South Works, South Chicago, Illinois. Ten stacks: Nos. 1, 2, 3, and 4, built in 1880–1; No. 4 remodeled in 1901 and Nos. 1, 2, and 3 remodeled in 1903; Nos. 1 and 2 are 75 x 20, No. 3 is 75 x 19, and No. 4 is 90 x 21; 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 88½ x 21, and No. 6 is 88½ x 20; sixteen Massicks & Crooke stoves. Nos. 9 and 10, each 95 x 22, built in 1900–1; No. 9 blown in July 3 and No. 10 December 13, 1901; eight 4-pass hot blast stoves. Fuel, Connellsville and Pocahontas coke; ores, Lake Superior and Northern ranges; product, Bessemer pig iron; total annual capacity, 1,200,000 tons. Equipped with four Heyl & Patterson pig-iron casting machines. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

Union Works, Chicago, Illinois. Furnaces at Ashland avenue and Thirty-first st., on the south branch of the Chicago river. Two stacks, Nos. 3 and 4, each 73 x 15½, built in 1881 and rebuilt in 1889; 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, 140,000 tons. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

Total annual capacity of the 19 active furnaces, excluding old No. 3 at Joliet: 1,930,000 gross tons of pig iron, ferromanganese, etc.

ROLLING MILLS AND STEEL WORKS—3.

Joliet Works, Joliet, Illinois. Built in 1870; two 10-gross-ton Bessemer steel converters; first blow made January 26, 1873, and first steel rail rolled March 15, 1873; annual capacity, 700,000 tons of Bessemer steel ingots. Steel rail mill has 7 heating furnaces, one 36-inch blooming train, one 23-inch rail train, and one Sellers 3-ton hammer; annual capacity, 600,000 tons of billets. Wire-rod mill contains one Garrett mill built in 1888 and another added in 1895 and 4 heating furnaces; annual capacity, 240,000 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 merchant products and its capacity is included in the figures given below for merchant and factory products.) Merchant mill, built in 1895, contains machinery for the production of merchant steel and railroad supplies, including spikes, bolts, nuts, washers, etc.; annual capacity of the merchant mill, 55,000 tons of merchant products; of factory products, 66,000 tons. Iron, brass, and steel foundries are connected with these works. Fuel, coal for steam, manufactured gas in the principal departments, and some fuel oil for heating purposes. Total annual capacity:

ingots, 700,000 tons; rolled products, 895,000 tons; and factory products, 66,000 tons.

Milwaukee Works, Milwaukee, Wisconsin. Built in 1868 and 1874; remodeled in 1895–6; 6 continuous heating furnaces, using gas as 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, 150,000 tons of light rails and steel bars and 60,000 tons of angles and splice bars. Fuel, coal and manufactured gas.

South Works, South Chicago, Illinois. Three 15-gross-ton Bessemer steel converters, twelve 10-ingot soaking pits, and one 3-high 40-inch blooming and one 3-high 27-inch finishing train, with 4 stands of rolls; first blow made June 14, 1882; product, Bessemer steel ingots, rails, and billets; first steel rail rolled in June, 1882; annual capacity, 880,000 tons of ingots and 720,000 tons of rails. Open-hearth steel department added in 1894–5; first steel made February 11, 1895; ten basic furnaces (four 50-gross-ton Wellman stationary and six 31-gross-ton Siemens); one plate train, with 2 stands of rolls, 34 x 90 and 34 x 132 inches, and 4 gas heating furnaces; product, fire-box, and boiler, ship, and tank plate; annual capacity, 240,000 tons of open-hearth ingots and 110,000 tons of plates. Slabbing mill added in 1898–9; first put in operation March 16, 1899; one 40-inch mill with rolls 84 inches long to roll slabs, billets, and blooms from 4 x 4 inches up to 24 x 24 inches; annual capacity, 240,000 tons of slabs, blooms, and billets. Iron, brass, and steel foundries are connected with these works. Fuel, coal for steam and manufactured gas, natural gas, and fuel oil for heating purposes. Total annual capacity: ingots, 1,120,000 tons; finished and partly finished rolled products, 1,070,000 tons. Seven 50-gross-ton basic open-hearth furnaces, with an annual capacity of 250,000 tons of ingots, are being added; also one 40-inch blooming mill with an annual capacity of 270,000 tons of blooms. These additions will probably be completed in July, 1904. One 28-inch structural mill and one 48-inch plate mill will also be installed.

Total annual capacity of the 3 rolling mills and steel works: 1,580,000 gross tons of Bessemer steel ingots, 240,000 tons of open-hearth steel ingots, 840,000 tons of slabs, blooms, and billets, 720,000 tons of standard sizes of steel rails, 110,000 tons of plates, 60,000 tons of angles and splice bars, 240,000 tons of wire rods, 150,000 tons of light rails and bars, and 121,000 tons of merchant and factory products.

When the new equipment at the South Works is installed the company will have an additional capacity of 250,000 tons of open-

hearth steel ingots, 270,000 tons of blooms, 150,000 tons of structural shapes, and 125,000 tons of plates.

WIRE-ROD AND BRIDGE AND STRUCTURAL PLANTS.

Joliet Works, Joliet, Ill. Product, wire rods; annual capacity, 240,000 tons.

North Works, North Chicago. Product, railroad and highway bridges; also erect iron and steel buildings; annual capacity, 15,000 tons.

BOLT, NUT, AND SPIKE WORKS.

Joliet Works, Joliet, Illinois. Product, steel bolts, nuts, and standard steel spikes. Sizes: bolts and nuts, from ½ of an inch to 1 inch; spikes, from 4 x ½ up to 5½ x ⅝ of an inch; annual capacity, 9,000 tons of bolts and nuts and 57,000 tons of spikes.

IRON, BRASS, AND STEEL FOUNDRIES.

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

South Works, South Chicago, Illinois. 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 2,000 tons of open-hearth steel castings.

Total annual capacity of the iron, brass, and steel foundries: 39,000 gross tons of castings.

CEMENT PLANTS—2 COMPLETED AND 1 BUILDING.

North Works, North Chicago, Illinois. Built in 1895; product, "Steel Puzzolan Cement" of high quality made from blast furnace slag; daily capacity, 500 barrels.

South Works, South Chicago, Illinois. Built in 1899–1900; product, "Universal Portland Cement;" daily capacity, 1,500 barrels. The "Universal Portland Cement" is of the highest quality, is a true Portland, and equals in every way the best foreign and American brands of Portland cement.

Buffington Cement Plant, Buffington, near Indiana Harbor, Ind. Commenced building in April, 1903; to be completed in September, 1904; product, "Universal Portland Cement;" daily capacity, 4,000 barrels. (The net weight of a barrel of cement is 380 pounds.)

Total daily capacity of the cement plants: 6,000 barrels.

RAILROADS, IRON-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 over 350 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, 115 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, West Virginia. For further information concerning this company and the Cundy Iron Company see pages 75–6 and 79.

THE NATIONAL TUBE COMPANY (OF OHIO).

The National Tube Company (of Ohio); general offices, Lorain, Ohio. Branch office, Frick Building, Pittsburgh. *Officers at Pittsburgh:* Wm. B. Schiller, President; Edward Worcester, First Vice-President; John D. Culbertson, Second Vice-President, Treasurer, and Secretary; and Taylor Allderdice, Third Vice-President. *Officer at Lorain:* 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—2 COMPLETED AND 2 BUILDING.

Lorain Furnaces, Lorain, Ohio. Two completed stacks and two stacks building. Completed stacks Nos. 1 and 2, each 100 x 22; No. 1, built in 1898–9 and blown in July 5, 1899; No. 2, built in 1898–9 and blown in August 23, 1899; eight Cowper fire-brick stoves, 100 x 21; fuel, Connellsville coke; ores, Lake Superior and Mesabi; product, Bessemer pig iron; total annual capacity, 350,000 tons. Brand, "Lorain." Equipped with one pig-iron casting machine. (Formerly operated by the Lorain Steel Company.)—*Active in 1903.*

The two furnaces now being erected will be known as Nos. 3 and 4 and each will be 85 x 22 feet; they will each be equipped with four Cowper fire-brick stoves, 100 x 21 feet; ground for No. 3 was broken on April 20, 1903, and for No. 4 on May 16, 1903; No. 3 will be ready for blast in July and No. 4 in September, 1904; their total annual capacity will be 300,000 tons of Bessemer pig iron.

Total annual capacity of the 2 completed furnaces, 350,000 gross tons; of the 2 building furnaces, 300,000 gross tons: total, 650,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1.

Lorain Works, Lorain, Ohio. Built in 1894–5, using rail-mill machinery from Johnstown, Pennsylvania; one 27-inch girder rail mill, with an engine at each end, making practically a double mill, 4 gas heating furnaces, and two 38-inch reversible blooming mills, one of which was built in 1899; product, blooms, billets, slabs, girder and T rails, and street railroad specialties; annual capacity, 550,000 tons. Bessemer steel department contains two 10-gross-ton acid converters and 28 soaking pits; first steel made April 1, 1895; product, Bessemer steel ingots; annual capacity, 625,000 tons. Fuel, coal and producer gas. Brand, "Lorain." (Formerly operated by the Lorain Steel Company.) Works to be enlarged in 1904 and to be equipped with one 34 x 90-inch plate mill, one 30 x 48-inch universal mill, one 28-inch reversing mill, and one 14-inch continuous mill, for making pipe skelp; estimated annual capacity, 325,000 tons.

Total annual capacity of the completed works: 625,000 gross tons of Bessemer steel ingots and 550,000 tons of rolled products.

BUILDING PIPE MILLS AND COMPLETED FOUNDRY.

Lorain Pipe Mills, Lorain, Ohio. Building works to be equipped for the manufacture of wrought-steel pipe; 4 lap-weld and 5 butt-weld furnaces; sizes, from ⅛ of an inch to 20 inches inclusive; estimated annual capacity, 300,000 tons.—*Will be completed in 1905.*

Lorain Works, Lorain, Ohio. Product, gray iron rolls, general loam castings, and ingot moulds; annual capacity, 10,000 tons of ingot moulds and 7,000 tons of castings. (Formerly operated by the Lorain Steel Company, of Lorain, Ohio.)

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 Agents: H. C. Evans, 74 Broadway, New York; F. J. Drake, Pennsylvania Building, Philadelphia; A. S. Littlefield, Monadnock Building, Chicago, Illinois, and Bank of Commerce Building, St. Louis, Missouri; S. P. S. Ellis, Carnegie Building, Pittsburgh, Pa.; William W. Kingston, Equitable Building, Atlanta, Georgia; R. Clitz, Western Reserve Building, Cleveland; and William B. Isaacs, Boyd Building, San Francisco, California. Capital stock, $3,000,000, all common. The company operates the following works:

FOUNDRIES, SWITCH AND DROP FORGING DEPARTMENTS, ETC.

Johnstown Works, Johnstown, Pa. Original works built in 1887–8 and put in operation May 13, 1888; open-hearth steel department started in 1889; two acid furnaces (one 5 and one 10-gross-ton); product, steel castings; annual capacity, 6,400 tons; fuel, coal and oil. A gray iron foundry is connected with these works; product, castings for rolls, commercial purposes, and special track work; annual capacity, 4,680 tons. A plant for the manufacture of drop forgings is also connected with the works; product, switch tongues, steam crossing brackets, and all kinds of forgings required in special work for street and steam railroads; annual capacity, 350 tons. Also a department for the manufacture of frogs and switches; product, switches, mates, curve crosses, split switches, girder crossings, frogs, etc., for steam and street railways; annual capacity, 1,000 tons of frogs and 10,000 tons of switches, etc. Also an electric-welding plant, which is equipped with portable welding machines for electrically welding joints in street railway tracks. (Formerly called the Johnson Works.)

MINNESOTA IRON COMPANY.

All the stock of the Minnesota Iron Company, amounting to $16,500,000, is owned by the Federal Steel Company. For further information concerning this company see pages 78–9.

THE ELGIN, JOLIET, AND EASTERN RAILROAD COMPANY.

The Elgin, Joliet, and Eastern Railroad Company operates 192.43 miles of main line, 24.85 miles of branches and spurs, 13.50 miles of second track, 112.64 miles of sidings, and 6.85 miles of road under trackage rights, making a total of 350.27 miles. The company owns 58 locomotives, 4 passenger cars, and 2,641 freight and other cars. Capital stock, $6,000,000, all common, and all owned by the Federal Steel Company.

STEAM AND GAS COAL LANDS.

In Washington, Allegheny, Somerset, Greene, and Fayette counties, Pennsylvania, the subsidiary companies of the United States Steel Corporation own 26,624 acres of steam and gas coal lands. In addition they own 6,500 acres of steam coal lands at or near their blast furnaces and rolling mills in Pennsylvania, West Virginia, Ohio, Indiana, and Illinois, making a total of 33,124 acres.

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:* Wm. B. Schiller, President; Edward Worcester, First Vice-President and General Manager of Sales; John D. Culbertson, Second Vice-President, Treasurer, and Secretary; Taylor Allderdice, Third Vice-President; B. C. Moise, Assistant Treasurer, Assistant Secretary, and Auditor; Peter Boyd, General Superintendent; George S. Garritt, Assistant General Manager of Sales; S. M. Lynch, Purchasing Agent; and Thomas Ewing, Solicitor.

Managers of Sales: New England, New York, and Philadelphia, Clifton Wharton, Jr., Havemeyer Building, New York; Pittsburgh, A. M. Lally, Frick Building; Chicago, H. S. Raymond, Rookery Building; St. Louis, E. A. Downey, Security Building; and Pacific Coast, Charles M. Woods, 420 California street, San Francisco, California.

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 following works:

BLAST FURNACES—5 COMPLETED AND 1 BUILDING.

Monongahela Furnaces, (National Department,) McKeesport, Pa. Two completed stacks and one building. Completed stacks, A and B, built in 1889-90: 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; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 275,000 tons. Equipped with one Uehling pig-iron casting machine. Ground for the foundations for the building furnace, which will be known as Furnace C, was broken on October 1, 1903; it will be 90 x 22 feet, will be equipped with four hot-blast stoves, and will have an annual capacity of 150,000 tons of Bessemer pig iron; it will probably be ready for blast in the summer or fall of 1904.—*Two furnaces active in 1903; one furnace building in 1904.*

Riverside Furnaces, (Riverside Department,) Benwood, Marshall county, West Virginia. Two stacks: Furnace A, 75 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, 100 x 21, built in 1901–3 and first blown in March 12, 1903; 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, 250,000 tons. Equipped with one Uehling pig-iron casting machine.—*Active in 1903.*

Steubenville Furnace, (Riverside Department,) Steubenville, Ohio. One stack, 75 x 16, built in 1872 and rebuilt in 1886; remodeled in 1901; three Massicks & Crooke stoves; fuel, by-product coke made from Connellsville coal; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 72,000 tons.—*Active in 1903.*

Total annual capacity of the 5 completed furnaces, 597,000 gross tons; of the building furnace, 150,000 tons: total, 747,000 tons.

ROLLING MILLS AND STEEL WORKS—7.

Boston Iron and Steel Works, (National Department,) 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, 45,000 tons of skelp and 15,000 tons of socket iron. Fuel, coal.

Elba Rolling Mills, (Continental Department,) Second ave., Pittsburgh, Pa. Built in 1862; 28 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one muck, and one 8, one 10, and one 18-inch); product, wrought iron and steel skelp; annual capacity, 40,000 tons. Fuel, bituminous coal and producer gas.

Monongahela Steel Works, (National Department,) McKeesport, Pa. Built in 1892–3; two 8-gross-ton Bessemer steel converters, four 10-foot cupolas, three 4-hole soaking pits, one 200-ton mixer, and one 2-high 36-inch reversing blooming train; first blow made December 14, 1893; product, slabs and billets; annual capacity, 330,000 tons of ingots and 300,000 tons of slabs and billets. Fuel, producer gas.

National Rolling Mills, (National Department,) McKeesport, Pa. Built from 1878 to 1896; 20 charcoal knobbling fires, 2 refinery fires, 2 heating furnaces, 2 steam hammers, 6 double and 25 single puddling furnaces, 26 heating furnaces, one train of 2-high slabbing rolls, 3 muck trains, one 82-inch plate mill, and 4 grooved mills (one 13, one 19, and one 22-inch, and one continuous); product, charcoal and wrought iron and steel skelp; annual capacity, 240,000 tons. Fuel, coal and producer gas. (The equipment of the National Forge and Iron Works, described separately in the Directory for 1901, is included in this description.)

Republic Iron Works, (National Department,) Twenty-fifth st., South

Side, Pittsburgh, Pa. Built in 1863; 26 single and 10 double puddling furnaces, 10 heating furnaces, one train of muck rolls, 2 grooved mills, (one 14 and one 16-inch,) and one 72-inch plate mill; product, wrought iron and steel skelp and plates; annual capacity, 40,000 tons of grooved skelp and 22,500 tons of plates. Fuel, natural gas and coal.

Riverside Skelp Mills, (Riverside Department,) Benwood, Marshall county, West Virginia. Built in 1885; 10 regenerative gas heating furnaces and 5 trains of 21-inch grooved rolls; product, steel skelp; annual capacity, 200,000 tons. Fuel, producer gas.

Riverside Steel Works, (Riverside Department,) 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 8-foot cupolas, and one 2-high 30-inch reversing blooming mill; product, steel ingots, slabs, and billets; annual capacity, 150,000 tons of ingots and 135,000 tons of slabs and billets. Fuel, producer gas.

Total annual capacity of the 7 rolling mills and steel works: Bessemer ingots, 480,000 tons; slabs and billets, 435,000 tons; skelp, 565,000 tons; plates, 22,500 tons; and socket iron, 15,000 tons.

GALVANIZED AND "KALAMEINED" PIPE WORKS.

National Galvanizing Works, (National Department,) Versailles, Allegheny county, Pa. Built in 1895; product, galvanized and "kalameined" pipe; annual capacity, 54,000 tons.

WROUGHT IRON AND STEEL PIPE AND TUBE WORKS—11.

Allison Department, Thirty-second and Walnut sts., Philadelphia, Pa. Product, charcoal iron boiler tubes; sizes, from 1½ to 8 inches inclusive; annual capacity, 13,000 tons.

American Department, Middletown, Pa. Product, wrought iron and steel pipe; sizes, from ⅛ of an inch to 16 inches inclusive; annual capacity, 85,000 tons. An iron foundry is connected with these works; also a department for the manufacture of galvanized tubular goods, with an annual capacity of 18,000 tons.

Chester Department, South Chester, Delaware county, Pa. Product, wrought iron and steel pipe; sizes, from 1½ to 12 inches inclusive; annual capacity, 50,000 tons.

Cohoes Department, Cohoes, Albany county, New York. Product, wrought iron and steel pipe; sizes, from ⅛ of an inch to 2 inches inclusive; annual capacity, 15,000 tons.

Continental Pipe Mills, (Continental Department,) Second avenue, Pittsburgh, Pa. Product, wrought iron and steel pipe; sizes, from ⅛ of an inch to 8 inches inclusive; annual capacity, 50,000 tons. A shop for the manufacture of thread protectors for all the pipe mills of the company is connected with these works.

National Pipe Mills, (National Department,) McKeesport, Pa. Product, wrought iron and steel pipe and charcoal iron and steel boiler tubes; sizes, from ⅛ of an inch to 30 inches inclusive; annual capacity, 300,000 tons. Also make iron and brass castings.

Pennsylvania Department, Second avenue, Pittsburgh, Pa. Product, wrought iron and steel pipe; sizes, from ⅛ of an inch to 30 inches inclusive; annual capacity, 120,000 tons.

Riverside Pipe Mills, (Riverside Department,) Benwood, W. Va. Product, wrought iron and steel pipe; sizes, from ⅛ of an inch to 8 inches inclusive; annual capacity, 95,000 tons. An iron foundry is connected with these works; also a department for the manufacture of galvanized tubular goods, with an annual capacity of 20,000 tons. (Formerly called the Riverside Tube Works.)

Sharon Tube Works, Sharon, Pa. Equipped to produce wrought-steel pipe; sizes, from ⅛ of an inch to 12 inches, outside diameter; annual capacity, 100,000 tons. (Owned by the Union Steel Company.)—*Never put in operation and not likely to be operated on their present site.* *See page 24.*

Syracuse Department, Syracuse, New York. Product, wrought iron and steel pipe and charcoal iron and steel boiler tubes; sizes, from 1¼ to 7 inches inclusive; annual capacity, 20,000 tons.

Youngstown Department, Youngstown, Ohio. Product, wrought-iron and steel pipe; sizes, from 1½ to 16 inches inclusive; annual capacity, 30,000 tons.

Total annual capacity of the 11 wrought iron and wrought steel pipe and tube works: 878,000 gross tons of pipe and boiler tubes and 38,000 tons of galvanized tubular goods.

SEAMLESS PIPE AND TUBE WORKS—2.

Standard Seamless Tube Works, (Seamless Department,) Ellwood City, Lawrence county, Pa. Product, seamless pipe and tubes.

United States Seamless Tube Works, (Seamless Department,) McKeesport, Pa. Product, seamless pipe and tubes.

IRON AND BRASS FOUNDRIES.

American Department, Middletown, Pa. Product, iron castings; annual capacity, 2,000 tons.

National Pipe Mills, (National Department,) McKeesport, Pa. Product, iron and brass castings; annual capacity, 7,500 tons of iron and 200 tons of brass castings.

Riverside Pipe Mills, (Riverside Department,) Benwood, West Virginia. Product, iron castings; annual capacity, 2,000 tons. (Formerly called the Riverside Tube Works.)

Total annual capacity of the foundries: 11,500 gross tons of iron castings and 200 tons of brass castings.

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

Semet-Solvay by-product coke ovens, Benwood, Marshall county, West Virginia. Number of ovens, 120; product, coke from Connellsville coal; annual capacity, 160,000 net tons. Plant owned by the National Tube Company but operated under lease by the Semet-Solvay Company.

The National Tube Company owns iron-ore mines in the Gogebic and Menominee Ranges of the Lake Superior region; it also owns an interest in limestone quarries in Lawrence county, Pa.

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, Pa. *Officers:* Wm. B. Schiller, President; Edward Worcester, First Vice-President; John D. Culbertson, Second Vice-President, Secretary, and Treasurer; J. H. Nicholson, Third Vice-President; J. M. Shaw, Auditor; and J. W. Phillips, Assistant Treasurer.

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—4.

Ellwood Works, (Factory B,) Ellwood City, Lawrence county, 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, 6,000 tons of blanks. Fuel, bituminous coal.

Greenville Works, (Factory C,) Greenville, Mercer county, 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 two 20-inch trains of rolls; product, bars and blanks for the manufacture of seamless-drawn steel tubes; annual capacity, 7,500 tons of blanks and 50,000 tons of bars. Fuel, bituminous coal and coke.

Shelby Works, (Factory A,) Shelby, Richland county, Ohio. Built in 1890 and first put in operation in July, 1891; 4 Swindell heating furnaces and 9 hot mills (one 10, four 12, and four 20-inch);

product, blanks for the manufacture of seamless-drawn steel tubes; annual capacity, 12,000 tons of blanks. Fuel, coal and oil.

Toledo Works, (Factory D,) Toledo, Lucas county, Ohio. Built in 1896; first rolled blanks produced in 1900; one heating furnace, one piercing machine, and 4 trains of rolls; product, blanks for the manufacture of seamless-drawn steel tubes; annual capacity, 8,000 tons of blanks. Fuel, coal.—*Idle.*

Total annual capacity of the 4 rolling mills: 33,500 gross tons of blanks for seamless-drawn steel tubes and 50,000 tons of bars.

SEAMLESS-DRAWN STEEL TUBE WORKS—6.

Albany Works, (Factory N,) Albany, Delaware county, Indiana. Product, cold-drawn seamless steel cycle tubes; sizes, from ¼ of an inch in diameter to 1½ inches; annual capacity, 5,000,000 feet.

Ellwood Works, (Factory B,) Ellwood City, Lawrence county, Pa. Product, cold-drawn seamless steel cycle and boiler tubes; sizes, from 1/16 of an inch in diameter to 1¾ inches; annual capacity, 6,000,000 feet of cycle tubes or 6,000 tons of boiler tubes.

Greenville Works, (Factory C,) Greenville, Mercer county, Pa. Product, cold-drawn seamless steel boiler tubes; sizes, from 3 to 5 inches in diameter; annual capacity, 7,500 tons.

Hartford Works, (Factory M,) Hartford, Hartford county, Connecticut. Product, cold-drawn seamless steel cycle tubes; sizes, 2 inches and under; annual capacity, 10,000,000 feet.

Shelby Works, (Factory A,) Shelby, Richland county, Ohio. Product, cold-drawn seamless steel boiler tubes; sizes, from ½ of an inch in diameter to 3¼ inches; also square, rectangular, and special sections; annual capacity 12,000 tons.

Toledo Works, (Factory D,) Toledo, Lucas county, Ohio. Product, seamless-drawn steel boiler tubes; sizes, from 3 to 4 inches in diameter; annual capacity, 8,000 tons.

Total annual capacity of the 6 seamless-drawn tube works: 21,000,000 feet of cycle tubes and 33,500 tons of boiler tubes.

UNITED STATES STEEL PRODUCTS EXPORT COMPANY.

United States Steel Products Export Company; general offices, Battery Park Building, 21 State st., New York. *Officers:* 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 has for its object the extension and development of the export trade of the United States Steel Corporation.

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, Rookery Building, Chicago. *Officers at Chicago:* J. S. Keefe, First Vice-President; F. L. Watson, Treasurer; A. F. Allen, Assistant Treasurer and Secretary; E. C. Lott, Manager Chicago District; Frank Baackes, General Sales Agent; D. A. Merriman and G. F. Rummel, Assistant General Sales Agents; and Max Pam, General Counsel. *Officers at Cleveland:* Wm. P. Palmer, President; C. A. Vogt, Auditor; E. E. Stone, General Purchasing Agent; R. W. Ney, Manager; J. H. Early, Assistant Manager; M. McMurray, General Superintendent Blast Furnaces and Steel Works, Cleveland and Pittsburgh Districts; and A. S. Chisholm, Assistant to President, Western Reserve Building. *Officers at Pittsburgh, Pa.:* C. L. Miller, General Superintendent, Frick Building; George W. Jewett, Manager, and S. W. Tener, Assistant Manager, Pittsburgh District, Shoenberger Works, Penn ave. and Fifteenth st. *Officer at New York City:* J. R. Thomas, Assistant Secretary and Assistant Treasurer, Battery Park Building. *Officers at Worcester, Massachusetts:* F. H. Daniels, Chief Engineer; H. G. Stoddard, Manager; and E. J. Watson, Assistant Manager, Worcester District.

Sales Offices and Agents: Domestic: Chicago, Rookery Building—F. Baackes, General Sales Agent; D. A. Merriman and G. F. Rummel, Assistant General Sales Agents. New York City, Battery Park Building—T. H. Taylor, Assistant General Sales Agent. San Francisco, California, Sixteenth and Folsom sts.—A. T. DeForest, Pacific Coast Sales Agent. Boston, Mass., Board of Trade Building—A. F. Walker, Sales Agent. Butte, Montana, 19 West Granite st.—Charles H. Lane, Sales Agent. Cleveland, Ohio, Western Reserve Building—H. T. Pratt, Sales Agent. Denver, Colorado, 515 Seventeenth st.—American Steel and Wire Company of Colorado; E. R. Pool, President. Los Angeles, Cal., 206 North Los Angeles st.—Burton W. Smith, Sales Agent. Pittsburgh, Pa., Frick Building—W. L. Hirsch, Sales Agent. Portland, Oregon, Ninth and Irving sts.—E. R. Eldredge, Sales Agent. St. Louis, Mo., 1935 Papin st.—O. B. Barrows, Sales Agent. St. Paul, Minnesota, 518 Endicott Building—N. R. McLeod, Sales Agent.

Salt Lake City, Utah—Grant Brothers, Sales Agents. *Foreign:* London, England, 29 Great St. Helens, E. C.—Millard Hunsicker, Manager. Montreal, Canada, New York Life Building—George A. Childs, Sales Agent. Hamburg, Germany—A. Auerbach, Agent. Constantinople, Turkey—A. Raditi, Agent. Salonica, Turkey—Jacques Fillipucci, Agent. Smyrna, Turkey—Saparte & Naar, Agents.

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, Albany county, opposite Troy, New York. Three stacks, each 80 x 18, built in 1886–7; twelve Whitwell stoves; fuel, anthracite coal and coke; ores, magnetic from Essex and Columbia counties; product, basic-Bessemer pig iron; total annual capacity, 180,000 tons. (Formerly called Troy Furnaces and owned by the Troy Steel Company; later by the Troy Steel Products Company.)—*Idle. Last active in 1897.*

Central Furnaces, Cleveland, Ohio. Three stacks: one, 75 x 20, built in 1881–2 and rebuilt in 1895–6, has one McClure and three Whitwell stoves; one, 80 x 20, built in 1887, has four fire-brick stoves; and one, 100 x 22, built in 1900–1 and blown in January 17, 1901, has four fire-brick stoves, each 22 x 100. Fuel, coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; total annual capacity, 395,000 tons. Molten metal is conveyed from these furnaces to the Newburgh Steel Works. Equipped with one Uehling pig-iron casting machine. Furnaces Nos. 1 and 2 will be rebuilt in 1904.—*Active in 1903.*

Edith Furnace, Allegheny, Pa. One stack, 97 x 20, built and blown in in 1898; one Massicks & Crooke and four Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product. Bessemer pig iron; annual capacity, 150,000 tons. One Uehling pig-iron casting machine. (Edith Furnace, 75 x 16½, built in 1882 and abandoned in 1898, is now used as a dust catcher.)—*Active in 1903.*

Emma Furnace, Cleveland, Ohio. One stack, 73 x 17, built in 1872; remodeled in 1882–3, 1890–1, and 1896; three Ford & Moncur stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 100,000 tons. Brand, "Emma." Molten metal is conveyed from this furnace to the Newburgh Steel Works. One Uehling pig-iron casting machine serves Emma Furnace and Newburgh Furnace.—*Active in 1903.*

Neville Island Furnace, Neville Island, Neville Township, Allegheny county, below Pittsburgh, Pa. One stack, 100 x 21, built in 1900–1 and blown in July 3, 1901; four Kennedy two-pass stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 168,000 tons. Equipped with one Uehling pig-iron casting machine.—*Active in 1903.*

Newburgh Furnace, Cleveland, Ohio. One stack, 62 x 16, built in 1872 and remodeled in 1886; rebuilt in 1895–6; fuel, coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; annual capacity, 75,000 tons. One Uehling pig-iron casting machine serves Newburgh Furnace and Emma Furnace.—*Active in 1903.*

Shoenberger Furnaces, Pittsburgh, Pa. Two stacks: one, 76 x 14, and one, 76½ x 16, built in 1865 and rebuilt in 1890; seven Massicks & Crooke stoves; fuel, coke; ore, Lake Superior; product, Bessemer and basic pig iron; total annual capacity, 175,000 tons. Equipped with two pig-iron casting machines.—*Active in 1903.*

Total annual capacity of the 12 furnaces: 1,243,000 gross tons.

ROLLING MILLS AND STEEL WORKS—16.

Allentown Works, Allentown, Lehigh county, Pa. Built in 1889 by the Iowa Barb Wire Company; 2 gas heating furnaces, 4 trains of rolls, (9, 10, 14, and 16-inch,) 162 wire-drawing blocks, and 169 wire-nail machines; product, wire rods drawn into wire and chiefly used by the company in the manufacture of barbed wire, wire nails, and wire hoops; annual capacity, 82,000 tons of wire rods, 69,000 tons of wire, and 600,000 kegs of wire nails. Fuel, coal and manufactured gas. A galvanizing plant is connected with the works.

American Works, Cleveland, Ohio. 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; one continuous rod mill with 3 gas producers, one heating furnace, and 3 trains of rolls; and 2,272 wire-drawing blocks; product, steel wire rods and wire; annual capacity, 125,000 tons of rods and 60,000 tons of wire. Fuel, coal. Galvanizing and tinning plants are connected with the works.

Anderson Works, Anderson, Madison county, Indiana. Built in 1889 by the American Wire Nail Company; 2 continuous heating furnaces, one rod mill, 104 wire-drawing blocks, and 165 wire-nail machines; product, steel wire rods, wire, and wire nails; annual capacity, 75,000 tons of rods, 70,000 tons of wire, and 650,000 kegs of nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works.

Braddock Works, Braddock, Allegheny county, Pa. Built in 1891 and put in operation in February, 1892; 3 heating furnaces, 3 trains of rolls, (9, 12, and 16-inch,) 118 wire-drawing blocks, and 132 wire-nail machines; product, steel wire rods, wire, and wire nails; annual capacity, 80,000 tons of wire rods, 73,500 tons of rolled and drawn products, (including 70,000 tons of wire,) and 675,000 kegs of wire nails. Fuel, bituminous coal. A galvanizing plant is connected with the works.

Breaker Island Works, on Breaker Island, Albany county, N. Y. Built at Troy, Rensselaer county, in 1864 and removed to Breaker Island (opposite Troy) and enlarged in 1896; first blow made at Troy on February 15, 1865; first blow made at Breaker Island on September 11, 1896; three 15-gross-ton basic-Bessemer converters, 4 cupolas, 4 spiegel cupolas, two 5-hole Hainsworth pit furnaces, and 24 soaking pits; annual capacity, 200,000 tons of ingots. Rolling mill connected with the steel works contains one 2-high 35-inch reversing blooming mill, with 42 x 60-inch reversing engines, and one 3-high 21-inch billet mill; product, billets, blooms, slabs, and skelp; annual capacity of rolled material, 200,000 tons. Fuel, bituminous coal. (Formerly called the Bessemer Steel Works and owned by the Troy Steel Company; later owned by the Troy Steel Products Company.)—*Idle.*

Consolidated Works, Cleveland, Ohio. Wire-drawing and wire-nail plants built in 1890–1 by the Baackes Wire Nail Company; rod mill added in 1892; 2 heating furnaces, 148 wire-drawing blocks, 274 wire-nail machines, 71 barbed-wire machines, and one 9, one 12, and one 16-inch train of rolls; product, steel wire rods, wire, galvanized wire, wire nails, staples, and American and Ellwood field fencing; annual capacity, 95,000 tons of rods, 80,000 tons of wire, and 1,100,000 kegs of nails. Fuel, coal and producer gas. A galvanizing plant is connected with the works.

Donora Works, Donora, Washington county, Pa. Built in 1900–1 and first put in operation in September, 1901; 4 heating furnaces, one continuous and one right and one left hand Garrett finishing rod mills, 308 wire-drawing blocks, and 282 wire-nail machines; product, wire rods, bright and galvanized wire, barbed wire, wire nails, and staples; annual capacity, 200,000 tons of wire rods, 172,000 tons of wire, and 1,600,000 kegs of wire nails. Fuel, natural gas and coal. A galvanizing plant is connected with the works. (Formerly operated and now owned by the Union Steel Company.)—*See page 22.*

H. P. Works, Cleveland, Ohio. Built in 1880 by the H. P. Nail Company and first put in operation in March, 1880; enlarged in 1891; 3 large gas heating furnaces, one 9, one 10, one 12, and

one 16-inch train of rolls, 200 wire-drawing blocks, and 613 wire-nail machines; product, steel wire rods, steel wire, wire nails, staples, tacks, and rivets; annual capacity, 60,000 tons of rods, 90,000 tons of finished products, (including 60,000 tons of wire,) and 1,100,000 kegs of wire nails. A plant for galvanizing nails, pole steps, etc., is connected with the works. Fuel, coal for boilers and producer gas for the rod mill.

Newburgh Steel Works, Newburgh, Cuyahoga county, Ohio. Bessemer steel works built in 1867–8 and remodeled and fitted with modern appliances in 1893; first blow made October 15, 1868; two 10-gross-ton converters; annual capacity, 525,000 tons of ingots. Open-hearth steel works built in 1876–8 and rebuilt in 1899–1900; one stationary and 4 rolling 50-gross-ton furnaces (2 acid and 3 basic); annual capacity, 143,000 tons of ingots. Blooming mill built in 1881 and remodeled in 1891; 8 soaking pits and 2 trains of rolls (one 2-high 38-inch reversing and one 3-high 23-inch); annual capacity, 440,000 tons of blooms, billets, and slabs. New blooming mill built in 1901; 4 soaking pits and one 2-high 35-inch reversing train of rolls; annual capacity, 220,000 tons of blooms, billets, and slabs. One rod mill built in 1902; annual capacity, 100,000 tons. A foundry, a forge, and a machine shop are also connected with the works. Product, Bessemer and open-hearth steel blooms, billets, slabs, wire rods, and forgings. Fuel, coal for steam and manufactured and natural gas for heating. (Rail, structural, and bar mills dismantled in 1901; one rod mill, dismantled in 1902, will probably be rebuilt.)

New Castle Works, New Castle, Pa. Built in 1887 and enlarged in 1891; rod mill added in 1889; 3 gas heating furnaces, 4 trains of rolls, (9, 10, 12, and 16-inch,) 111 wire-drawing blocks, and 185 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 90,000 tons of rods, 75,000 tons of wire, and 900,000 kegs of nails. Fuel, bituminous coal.

Rankin Works, Rankin Station, Allegheny county, Pa. Built in 1885–6 by the Braddock Wire Company; rod mill rebuilt in 1897; 2 heating furnaces, 4 trains of rolls, (two 9, one 12, and one 18-inch,) 132 wire-drawing blocks, 191 wire-nail machines, and 86 barbed-wire machines; 4-inch billets rolled into No. 5 rods in 18 passes through 4 trains of rolls; product, steel wire rods, plain and galvanized market wire, barbed wire, wire nails, and field fencing; annual capacity, 100,000 tons of wire rods, 90,000 tons of wire, and 1,000,000 kegs of wire nails. Fuel, bituminous coal and manufactured gas. Galvanizing and field fencing plants are connected with the works.

Sharon Works, Sharon, Pa. Built in 1900–1 and first put in op-

eration in May, 1901; first wire rods rolled in August, 1901; 3 continuous heating furnaces, 2 reheating furnaces, one continuous billet mill, 2 continuous rod mills, one tinplate bar mill, 180 wire-drawing blocks, and 181 wire-nail machines; product, tinplate bars, wire rods, wire, wire nails, galvanized wire, barbed wire, and staples; annual capacity, 97,000 tons of tinplate bars, 105,000 tons of wire rods, 86,000 tons of wire, and 900,000 kegs of wire nails. Fuel, producer gas and coal. A galvanizing plant is connected with the works. (Formerly owned and operated by the Sharon Steel Company; now owned by the Union Steel Company.)—*See pages 22–3.*

Shoenberger Works, Fifteenth st. and Penn ave., Pittsburgh, Pa. Established in 1824; 16 gas producers, 12 heating furnaces, 4 soaking pits, 4 annealing furnaces, 13 trains of rolls, (one 8, two 9, one 16, and one 22-inch bar, one 54 x 24-inch, two 60 x 24-inch, and one 72 x 24-inch sheet, one 34 x 127-inch plate, 2 blooming, (one 32 and one 36-inch,) and one continuous train,) and 18 horseshoe machines. Open-hearth steel department added in 1879; first steel made (acid) in June or July of that year; first acid blooms rolled September 12, 1879; works now contain three 35-gross-ton basic furnaces and two 7-gross-ton Bessemer converters with modern appliances; first blow 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 and billets, horseshoe bars, and toe calks; annual capacity, 75,000 tons of open-hearth ingots, 319,000 tons of Bessemer ingots, 440,000 tons of blooms, billets, and slabs, and 407,000 tons of other rolled products, including 257,000 tons of rod billets. Fuel, natural gas, manufactured gas, and bituminous coal.

South Works, Worcester, Massachusetts. Rolling mill built in 1846; 12 heating furnaces, one 34-inch blooming mill, 5 rod mills, and 219 wire-drawing blocks; product, billets, iron and steel wire rods, copper rods, iron and steel wire, copper wire, galvanized, telegraph, and barbed wire, staples, woven wire fence, springs, wire rope, electrical wire, copperas, and venetian red; annual capacity, 155,000 tons of rods and 52,150 tons of wire. Open-hearth steel department contains one 15 and three 20-gross-ton stationary furnaces and four 50-gross-ton rolling furnaces (5 acid and 3 basic); first open-hearth steel made September 26, 1885; annual capacity, 170,000 tons of ingots and 165,000 tons of billets. Fuel, coal and manufactured gas. Galvanizing and tinning plants are connected with the works.

Twenty-sixth Street Works, Twenty-seventh and Smallman sts., Pittsburgh, Pa. Bessemer steel plant built in 1881 and remod-

eled in 1891; two 5-gross-ton converters; first blow made August 26, 1881; 2 heating furnaces and one train of 32-inch rolls; product, billets, blooms, and slabs from 4 x 4 inches to 20 x 8 inches; annual capacity, 194,000 tons of ingots and 176,000 tons of billets and slabs. Fuel, natural gas and coal.

Waukegan Works, Waukegan, Lake county, 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; 6 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, 1,166 wire-drawing blocks, and 32 wire-nail machines; product, steel and copper wire rods, plain, galvanized, telegraph, mattress, tinned, and broom wire, barbed wire, wire nails, staples, springs, bale ties, etc.; annual capacity, 131,000 tons of rods, 115,000 tons of wire, and 60,000 kegs of nails. Fuel, coal and coke. Galvanizing and tinning plants are connected with the works.

Total annual capacity of the 16 rolling mills and steel works: Bessemer steel ingots, 1,238,000 gross tons; open-hearth steel ingots, 388,000 tons; billets, blooms, slabs, etc., 1,641,000 tons; wire rods, 1,398,000 tons; and plates, sheets, skelp, horseshoe bars, horse and mule shoes, rod billets, tinplate bars, etc., 504,000 tons.

13 WIRE-ROD MILLS, 22 WIRE-DRAWING PLANTS, AND 16 WIRE-NAIL PLANTS.

Allentown Works, Allentown, Pa. Product, wire rods drawn into wire and chiefly used by the company in the manufacture of barbed wire, galvanized wire, wire nails, staples, etc.; annual capacity, 82,000 tons of wire rods, 69,000 tons of wire, and 600,000 kegs of wire nails. Wire department: 162 wire-drawing blocks; draws wire from No. 00 to No. 20 gauge. Wire-nail department: 169 nail machines; makes all sizes of wire nails.

American Works, Cleveland, Ohio. Product, steel wire rods, pump rods, and galvanized, mattress, broom, telegraph, flat, shaped, and other wire; annual capacity, 125,000 tons of rods and 60,000 tons of wire. Wire department: 2,272 wire-drawing blocks; draws wire from $\frac{7}{8}$ of an inch down to No. 34 gauge. Do not make wire nails.

Anderson Works, Anderson, Indiana. Product, steel wire rods, plain wire, galvanized and barbed wire, wire nails, staples, etc.; annual capacity, 75,000 tons of rods, 70,000 tons of wire, and 650,000 kegs of wire nails. Wire department: 104 wire-drawing blocks; draws wire from No. 000 to No. 21 gauge inclusive. Wire-nail department: 165 nail machines; makes all sizes of wire nails.

Bluff Street Works, Joliet, Illinois. Product, bright and annealed wire; number of wire-drawing blocks, 67; sizes, from No. 2 to No. 18 gauge; annual capacity, 35,000 tons. Do not roll rods or make wire nails.

Braddock Works, Braddock, Pa. Product, Bessemer and basic open-hearth steel wire rods, plain wire, varnished wire, galvanized wire, fence staples, and wire nails; annual capacity, 80,000 tons of wire rods, 73,500 tons of rolled and drawn products, (including 70,000 tons of wire,) and 675,000 kegs of wire nails. Wire department: 118 wire-drawing blocks; draws wire from $\frac{3}{4}$ of an inch down to $\frac{1}{32}$ of an inch in diameter. Wire-nail department: 132 nail machines; makes all sizes of wire nails.

Central Works, Worcester, Massachusetts. Product, bright, coppered, tinned, galvanized, and annealed wire; number of wire-drawing blocks, 1,153; sizes, from $\frac{1}{2}$ of an inch to No. 33 gauge; annual capacity, 22,000 tons. Galvanizing and tinning plants are connected with the works. Do not roll rods or make wire nails.

Consolidated Works, Cleveland, Ohio. Product, steel wire rods, plain wire, galvanized and barbed wire, staples, wire nails, and American and Ellwood field fencing; annual capacity, 95,000 tons of rods, 80,000 tons of wire, and 1,100,000 kegs of nails. Wire department: 148 wire-drawing blocks; draws wire from rods down to No. 19 gauge. Wire-nail department: 274 nail machines; sizes, from $\frac{5}{8}$ of an inch to 9 inches.

De Kalb Works, De Kalb, De Kalb county, Illinois. Product, plain wire, galvanized and barbed wire, wire nails, staples, woven wire fencing, and poultry netting. Wire department: sizes, from No. 0 to No. 20 gauge; number of wire-drawing blocks, 182; annual capacity, 75,000 tons. Wire-nail department: number of machines, 156; standard sizes; annual capacity, 1,025,000 kegs. A galvanizing department is connected with the works. Do not roll rods.

Donora Works, Donora, Pa. Product, wire rods, plain, galvanized, and barbed wire, staples, and all sizes of wire nails; annual capacity, 200,000 tons of rods, 172,000 tons of wire, and 1,600,000 kegs of nails. Wire department: number of wire-drawing blocks, 308; sizes of wire drawn, from $\frac{5}{8}$ of an inch to $\frac{1}{32}$ of an inch. Wire-nail department: number of machines, 282; sizes, from 2-penny spike to 2-penny nail. (Formerly operated and now owned by the Union Steel Company.)—*See page 24.*

Granite City Works, Granite City, Madison county, Illinois. Product, market wire, annealed and galvanized barbed wire, steel wire nails, hog and cattle wire, etc. Wire department: sizes, from No. 0 to No. 14 gauge; number of wire-drawing blocks,

55; annual capacity, 24,000 tons. Wire-nail department: number of machines, 32; sizes, from 3-penny to 40-penny; annual capacity, 75,000 kegs. A galvanizing plant is connected with the works. Do not roll rods.

H. P. Works, Cleveland, Ohio. Product, steel wire rods, steel wire, galvanized wire, common and special wire nails, staples, tacks, spikes, pole steps, rivets, etc.; annual capacity, 60,000 tons of rods, 90,000 tons of finished products, (including 60,000 tons of wire,) and 1,100,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 200; sizes, from 1-inch shafting down to No. 25 gauge. Wire-nail department: number of machines, 613; makes all sizes of wire nails.

Newburgh Steel Works, Newburgh, Ohio. Product, wire rods; annual capacity, 100,000 tons. Do not draw wire or make wire nails.

Newburgh Wire Works, Newburgh, Ohio. Product, plain wire, barbed wire, galvanized wire, tinned wire, annealed wire, staples, cold-rolled shafting, etc.; number of wire-drawing blocks, 2,147; sizes, from $\frac{3}{8}$ of an inch to No. 33 gauge; annual capacity, 90,000 tons. Galvanizing and tinning plants are connected with the works. Do not roll rods or make wire nails.

New Castle Works, New Castle, Pa. Product, wire rods, wire, and wire nails; annual capacity, 90,000 tons of rods, 75,000 tons of wire, and 900,000 kegs of nails. Wire department: number of wire-drawing blocks, 111; sizes, from $\frac{3}{8}$ of an inch to No. 22 gauge. Wire-nail department: number of machines, 185; sizes, from 2-penny fine to 60-penny common.

North Works, Worcester, Mass. Product, iron, steel, and copper wire, shaped wire, music, mattress, and broom wire, wire nails, galvanized wire, springs, bale ties, bicycle spokes, etc. Wire department: number of wire-drawing blocks, 4,433; all sizes down to .003 of an inch in diameter; annual capacity, 57,200 tons. Wire-nail department: number of machines, 103; all sizes and kinds; annual capacity, 400,000 kegs. Galvanizing and tinning departments are connected with the works. Do not roll rods.

Pacific Works, San Francisco, California. Product, street railway and submarine cable, plain and annealed wire, wire rope, and springs; number of wire-drawing blocks, 13; sizes, from 000 to No. 24 gauge; annual capacity, 3,500 tons of plain wire and 7,500 tons of rope and cable wire. Do not roll rods or make wire nails.

Rankin Works, Rankin Station, Pa. Product, steel wire rods, plain and galvanized market wire, barbed wire, wire nails, staples, and woven wire fencing; annual capacity, 100,000 tons of wire rods,

90,000 tons of wire, and 1,000,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 132; draws all sizes of wire. Wire-nail department: number of nail machines, 191; makes all sizes of wire nails.

Rockdale Works, near Joliet, Illinois. Product, plain wire, galvanized and barbed wire, wire nails, staples, woven wire fence, poultry netting, etc.; annual capacity, 68,000 tons of wire and 160,000 kegs of wire nails. Wire department: number of wire-drawing blocks, 176; sizes, from No. 2 to No. 22 gauge inclusive. Wire-nail department: number of nail machines, 21 double; sizes, from 3-penny to 60-penny. 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, 41; sizes, from rods down to No. 21 gauge; annual capacity, 20,000 tons. Wire-nail department: number of machines, 128; sizes, from ¼ of an inch to 7 inches; annual capacity, 450,000 kegs. Do not roll rods.

Scott Street Works, Joliet, Illinois. Product, plain wire, galvanized and barbed wire, wire nails, wire hoops, staples, etc. Wire department: number of wire-drawing blocks, 146; sizes, from No. 00 to No. 22 gauge inclusive; annual capacity, 88,000 tons. Wire-nail department: number of machines, 259; standard and special sizes; annual capacity, 1,250,000 kegs. A galvanizing plant is connected with the works. Do not roll rods.

Sharon Works, Sharon, Pa. Product, wire rods, plain wire, barbed wire, wire nails, galvanized staples, etc.; annual capacity, 105,000 tons of rods, 86,000 tons of wire, and 900,000 kegs of nails. Wire department: number of wire-drawing blocks, 180; sizes, from ⅝ of an inch to No. 22 gauge. Wire-nail department: number of machines, 181; sizes, from 3-penny fine to 60-penny. (Formerly operated by the Sharon Steel Company; now owned by the Union Steel Company.)—*See page 24.*

South Works, Worcester, Massachusetts. Product, iron and steel wire rods, copper rods, iron and steel wire, copper wire, galvanized, telegraph, and barbed wire, staples, woven wire fence, poultry netting, etc.; annual capacity, 155,000 tons of rods and 52,150 tons of wire. Wire department: number of wire-drawing blocks, 219; draws wire from ½ of an inch to No. 20 gauge. Do not make wire nails.

Waukegan Works, Waukegan, Ill. Product, steel and copper wire rods, plain, galvanized, telegraph, mattress, and broom wire, barbed wire, wire nails, staples, springs, bale ties, etc.; annual capacity, 131,000 tons of rods, 115,000 tons of wire, and 60,000 kegs of nails. Wire department: number of wire-drawing blocks, 1,166;

draws wire from $\frac{1}{2}$ of an inch to No. 22 gauge. Wire-nail department: number of machines, 32; sizes, from 3-penny to 30-penny.

Total annual capacity of the 13 wire-rod mills, 22 wire-drawing plants, and 16 wire-nail plants: wire rods, 1,398,000 gross tons; wire, 1,489,350 tons; and wire nails, 11,945,000 kegs of 100 lbs.

COLD-DRAWN STEEL WORKS—2.

Newburgh Wire Works, Newburgh, Ohio. Product, cold-drawn steel shafting and machine screw stock. Sizes: rounds, squares, hexagons, and flats, from $\frac{7}{16}$ of an inch to $2\frac{1}{2}$ inches. Annual capacity, 7,000 tons.

North Works, Worcester, Mass. Product, cold-drawn steel shafting and screw stock. Sizes: rounds, from $\frac{15}{32}$ of an inch to $1\frac{1}{8}$ inches; squares and hexagons, from $\frac{7}{16}$ to $\frac{15}{16}$ of an inch; and flats, from $\frac{1}{8}$ to $\frac{1}{2}$ of an inch by $\frac{7}{16}$ of an inch to 2 inches. Annual capacity, 1,200 tons.

Total annual capacity of the 2 works: 8,200 gross tons.

GALVANIZING WORKS—18.

Allentown Works, Allentown, Pa. Number of galvanizing pans, 3; product, galvanized wire; annual capacity, 51,500 tons.

American Works, Cleveland, Ohio. Number of galvanizing pans, 3; product, fence and telegraph wire; annual capacity, 24,500 tons.

Anderson Works, Anderson, Indiana. Number of galvanizing pans, 3; product, fence wire; annual capacity, 18,900 tons.

Braddock Works, Braddock, Pa. Number of galvanizing pans, 2; product, fence wire; annual capacity, 35,000 tons.

Central Works, Worcester, Massachusetts. Number of galvanizing pans, 1; product, fence wire; annual capacity, 19,200 tons.

Consolidated Works, Cleveland, Ohio. Number of galvanizing pans, 2; product, fence wire; annual capacity, 35,000 tons.

De Kalb Works, De Kalb, Illinois. Number of galvanizing pans, 3; product, fence and netting wire; annual capacity, 32,000 tons.

Donora Works, Donora, Pa. Number of galvanizing pans, 4; product, fence wire; annual capacity, 67,500 tons.—*See page 24.*

Granite City Works, Granite City, Illinois. Number of galvanizing pans, 2; product, fence wire; annual capacity, 8,500 tons.

H. P. Works, Cleveland, Ohio. Number of revolving furnaces, 7; product, galvanized nails, spikes, pole steps, etc.; annual capacity, 7,000 tons.

Newburgh Wire Works, Newburgh, Ohio. Number of galvanizing pans, 3; product, fence wire; annual capacity, 32,200 tons.

North Works, Worcester, Massachusetts. Number of galvanizing pans, 3; product, fine and flat wire; annual capacity, 1,950 tons.

Rankin Works, Rankin Station, Pa. Number of galvanizing pans, 4; product, fence wire; annual capacity, 49,000 tons.

Rockdale Works, near Joliet, Illinois. Number of galvanizing pans, 4; product, fence and netting wire; annual capacity, 66,000 tons.

Scott Street Works, Joliet, Illinois. Number of galvanizing pans, 3; product, fence wire; annual capacity, 28,000 tons. Number of furnaces, 6; product, galvanized nails; annual capacity, 4,000 tons.

Sharon Works, Sharon, Pa. Number of galvanizing pans, 3; product, fence wire; annual capacity, 28,000 tons.—*See page 24.*

South Works, Worcester, Mass. Number of galvanizing pans, 8; product, fence, telegraph, and armor wire; annual capacity, 32,000 tons.

Waukegan Works, Waukegan, Illinois. Number of galvanizing pans, 6; product, fence and telegraph wire and pump rods; annual capacity, 69,000 tons.

Total annual capacity of the 18 galvanizing works: 609,250 gross tons of all kinds of galvanized products.

TINNING WORKS—6.

American Works, Cleveland, Ohio. Number of tinning furnaces, 8 double; product, market, broom, mattress, bottling, etc., wire; annual capacity, 3,500 net tons.

Central Works, Worcester, Massachusetts. Number of tinning furnaces, 6 double; product, mattress and broom wire; annual capacity, 1,800 net tons.

Newburgh Wire Works, Newburgh, Ohio. Number of tinning furnaces, 21; product, market, mattress, broom, and fine wire; annual capacity, 5,000 net tons.

North Works, Worcester, Massachusetts. Number of tinning furnaces, 12 double and 2 single; product, market, mattress, broom, fine, flat, card, music, and other wire; annual capacity, 6,600 net tons.

South Works, Worcester, Massachusetts. Number of tinning furnaces, 1; product, tinned copper wire; annual capacity, 2,750 net tons.

Waukegan Works, Waukegan, Illinois. Number of tinning furnaces, 7 double; product, market, mattress, broom, and fine wire; annual capacity, 5,000 net tons.

Total annual capacity of the 6 tinning works: 24,650 net tons.

PLANTS FOR THE MANUFACTURE OF COPPERAS—5.

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

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

Rockdale Works, near Joliet, Illinois. Annual capacity, 2,500 tons.

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

Waukegan Works, Waukegan, Illinois. Annual capacity, 4,500 tons.

Total annual capacity of the 5 works: 20,000 gross tons of copperas.

DIE FOUNDRIES—2.

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.

ZINC WORKS—2.

The American Steel and Wire Company of New Jersey operates a zinc smelting plant at Cherryvale, Kansas, containing 4,800 retorts, with an annual capacity of 22,500 net tons of spelter. It also operates a zinc smelting plant at Carondelet, Missouri, containing 2,000 retorts, with an annual capacity of 8,500 net tons of spelter.

Total annual capacity of the 2 works: 31,000 net tons of spelter.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

The American Steel and Wire Company of New Jersey controls the Sauntry iron-ore mine in St. Louis county, Minnesota, the Alpena mine, adjoining the Sauntry 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 mine, in Michigan, in the Marquette Range; and the Cuff mine, in Dickinson county, and the Hill Top mine, at Crystal Falls, Michigan, 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 79.

NATURAL GAS PROPERTIES.

The Carnegie Natural Gas Company, all the stock of which is owned by the Carnegie Steel Company (of New Jersey), owns or leases in Pennsylvania, Ohio, and West Virginia 124,777 acres of natural gas property. In addition it owns 331 miles of pipe line and 3 pumping stations. Extensive natural gas territory and pipe lines are owned in Pennsylvania and in the gas belt district in Indiana by the American Sheet and Tin Plate Company.

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.

American Sheet and Tin Plate Company; general offices, Frick Building, Pittsburgh, Pa. *Officer at New York:* George G. McMurtry, Chairman of the Board of Directors, P. O. Box 814. *Officers at Pittsburgh:* W. T. Graham, President; C. W. Bray, First Vice-President and Chief Engineer; E. W. Pargny, Second Vice-President and Manager of Sales; W. P. Beaver, Assistant to President; S. A. Davis, Assistant to First Vice-President; Howard M. Davis, Assistant Manager of Sales; H. B. Wheeler, Secretary and Treasurer; H. L. Austin, Auditor; G. M. McGinnis, Assistant Auditor; and R. A. McKinney, Purchasing Agent. *District Sales Agents:* Frank Dickerson, Battery Park Building, New York; W. H. Eaton, Marquette Building, Chicago, Illinois; W. J. Wetstein, St. Louis, Missouri; I. B. Williams, San Francisco, California; Richard R. Hoge, Portland, Oregon; E. W. Sparhawk, Denver, Colorado; J. R. Scott, New Orleans, Louisiana; and W. T. Shannon, Cincinnati, Ohio.

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 works:

ROLLING MILLS AND STEEL WORKS—41.

Aetna-Standard Works, Bridgeport, Belmont county, Ohio. Built in 1872 and since enlarged; 6 regenerative gas heating furnaces, 12 pair and 16 sheet furnaces, 6 combination pair and sheet furnaces, 16 double box annealing furnaces, one 3-high plate mill 30 x 66 inches, 6 jobbing mills, (one 28 x 50, one 28 x 60, two 26 x 60, one 26 x 50, and one 26 x 42-inch,) 16 hot sheet mills, (two 24 x 38, one 24 x 36, one 24 x 32, seven 26 x 38, two 26 x 36, and three 26 x 32-inch,) and 6 cold mills (one 22 x 54, one 22 x 46, one 22 x 44, two 22 x 42, and one 22 x 40-inch); product, black sheets and painted and formed roofing; annual capacity, 105,000 net tons of sheets. Fuel, natural gas and coal. (Formerly operated by the American Sheet Steel Company.)

American Works, Elwood, Madison county, Indiana. Built in 1891–2 and first put in operation in June, 1892; 28 pair and 28 sheet furnaces, 3 annealing furnaces, and 28 hot and 20 cold mills; product, black plates for tin and terne plates; annual capacity, double turn, 52,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Anderson Works, Anderson, Madison county, Indiana. Built in 1894–5 and put in operation August 1, 1895; 7 double heating furnaces, one large annealing furnace, and 7 hot and 6 cold mills; product, black plates for tinning; annual capacity, 14,000 gross tons. Fuel, natural gas. Make tinplates. (Formerly operated by the American Tin Plate Company.)

Beaver Works, Lisbon, Columbiana county, Ohio. Built in 1894–5 and first put in operation April 10, 1895; 7 sheet and 7 pair furnaces, 4 double annealing furnaces, and seven 24 x 32-inch hot and seven 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 15,600 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Cambridge Works, Cambridge, Guernsey county, Ohio. Built in 1894 and first put in operation January 1, 1895; 6 double heating furnaces, 5 annealing furnaces, and six 24 x 32-inch hot and seven 20 x 32-inch cold mills; product, black plates for tinning; annual capacity, 14,000 gross tons. Fuel, bituminous coal. (Formerly operated by the American Tin Plate Company.)

Canton Works, Canton, Stark county, 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, four 24 x 40-inch and one 24 x 36-inch hot sheet mills, and one 22 x 44-inch and one 22 x 36-inch cold mill; product, iron and steel black sheets for stamping and roofing; annual capacity, 16,250 net tons. Fuel, natural gas and coal. (Formerly operated by the American Sheet Steel Company.)

Chester Works, Chester, Hancock county, West Virginia. Post office address, East Liverpool, Ohio. 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, 3 annealing furnaces, one 26 x 44-inch sheet mill, 6 hot black plate mills, (two 26 x 34, three 26 x 32, and one 26 x 26-inch,) 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, 18,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Crescent Works, Cleveland, Ohio. Built in 1895 and first put in operation June 1, 1895; 6 pair and 6 heating furnaces, one double annealing furnace, and 6 hot mills, (four 26 x 32, one 26 x 34, and one 26 x 28-inch,) and 7 cold mills (six 22 x 38 and one 22 x 42-inch); product, black plates for tinning and stamping; annual capacity, 14,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Dennison Works, Dennison, Tuscarawas county, Ohio. Built in 1897 and first put in operation November 10, 1897; 4 pair, 4 sheet, and 4 single annealing furnaces, two 26 x 38-inch and two 26 x 32-inch hot sheet mills, and two 24 x 44-inch cold mills; product, common cold-rolled sheets for stamping and black plates for tinning; annual capacity, 8,750 net tons. Fuel, bituminous coal. (Formerly operated by the American Sheet Steel Company.)

Dover Works, Canal Dover, Tuscarawas county, Ohio. Built in 1865–6 and enlarged in 1895; first iron rolled in 1866; 7 pair, 5 sheet, and 4 combination pair and sheet furnaces, one softening furnace, 6 single and 2 double annealing furnaces, one 28 x 60-inch plate mill, 9 hot sheet mills, (one 26 x 44, six 26 x 38, and two 26 x 34-inch,) and three 24 x 48-inch cold mills; 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, 33,750 net tons of black sheets and 15,000 net tons of galvanized sheets. Fuel, coal. Also make metal laths. (Formerly called the Reeves Works and operated by the American Sheet Steel Company.)

Dresden Works, Dresden, Muskingum county, Ohio. Built and put in operation in 1898; 4 sheet furnaces, 4 pair furnaces, 2 double annealing furnaces, one 26 x 48-inch, two 26 x 38-inch, and one 26 x 34-inch hot sheet mills, and one 24 x 48-inch and one 24 x 52-inch cold mill; product, iron and steel sheets; annual capacity, 12,500 net tons. Fuel, coal. (Formerly operated by the American Sheet Steel Company.)

Falcon Works, Niles, Trumbull county, Ohio. Built in 1892–3 and first put in operation in April, 1893; 12 sheet and pair furnaces, one annealing furnace, 6 hot mills, (one 26 x 32, two 25 x 30, two 25 x 28, and one 25 x 26-inch,) and 7 cold mills (one 22 x 40, one 22 x 38, and five 22 x 36-inch); product, black plates for tinning; annual capacity, 14,000 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Falcon Works, Niles, Trumbull county, Ohio. Built in 1867; 9 single and 5 double puddling furnaces, 2 sheet bar pile furnaces, 4 pair and 4 sheet furnaces, 10 single box annealing furnaces, one 20-inch skelp mill, one 24-inch bar mill, one 24 x 38-inch muck mill, one 24 x 34-inch and three 24 x 38-inch hot sheet mills, and two 22 x 48-inch cold mills; product, muck bar and sheet iron and sheet steel; annual capacity, 23,000 gross tons of muck bar and 11,500 net tons of sheet iron and sheet steel. Fuel, bituminous coal and slack. (Formerly operated by the American Sheet Steel Company.)

Guernsey Works, Cambridge, Guernsey county, Ohio. Built in 1889–90 and put in operation in July, 1890; 2 bar furnaces, 6 sheet and 6 pair furnaces, one combination sheet and pair furnace, 6 double annealing furnaces, one 18-inch muck mill, four 26 x 38-inch, one 26 x 48-inch, one 26 x 34-inch, and one 26 x 32-inch sheet mills, all hot, and three 22 x 50-inch cold mills; product, sheet bars, black sheets, painted and formed roofing, and galvanized sheets; annual capacity, 23,750 net tons of sheet iron and sheet steel. (*Sheet bar mill idle.*) Fuel, producer gas for bar mill and natural gas and coal for sheet mill. Brand for galvanized sheets, "Apollo C" in a diamond. Also operate a galvanizing plant with an annual capacity of 37,500 net tons. (Formerly called the Cambridge Works and operated by the American Sheet Steel Company.)

Humbert Works, South Connellsville, Fayette county, 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 22 x 30-inch cold mills; product, black plates for tinning; annual capacity, 13,500 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Hyde Park Works, Hyde Park, Westmoreland county, Pa. Built in 1895 and first put in operation September 1, 1895; 4 Bailey combination sheet and pair furnaces, one single sheet furnace, one single pair furnace, 2 billet heating furnaces, 7 annealing furnaces, one 24-inch sheet bar mill, five 24 x 40-inch hot sheet mills, and one 24 x 44-inch and one 24 x 40-inch cold mill; product, sheet bars and 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, 25,000 gross tons of sheet bars and 15,000 net tons of sheets. Fuel, natural gas. (Formerly operated by the American Sheet Steel Company.)

Irondale Works, Middletown, Henry county, Indiana. Built in

1893–4, using machinery from the Irondale Steel and Iron Company's mill at Anderson, which was destroyed by fire on October 31, 1893; 4 pair and 4 sheet furnaces and four 25 x 32-inch hot mills; product, black plates for tinning; annual capacity, 10,000 gross tons. Fuel, coal and natural gas. (Formerly operated by the American Tin Plate Company.)

La Belle Works, Wheeling, West Virginia. Black plate mill added to rolling mill in 1893 and first black plates made in April, 1894; 10 sheet and 10 pair furnaces, 4 annealing furnaces, and one 24 x 36 and nine 24 x 32-inch hot and ten 22 x 32-inch cold mills; product, black plates for tinning; annual capacity, 20,000 gross tons. Fuel, natural gas. Make tinplates. (Formerly operated by the American Tin Plate Company.)

Laughlin Works, Martins Ferry, Belmont county, Ohio. Black plate mill added to rolling mill in 1895 and first black plates made in August, 1895; 23 sheet and 23 pair furnaces, 4 annealing furnaces, and twenty-three 26 x 32-inch hot and twenty-two 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 50,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Leechburg Works, Leechburg, Armstrong county, Pa. Built in 1872; 10 pair furnaces, 10 sheet furnaces, 2 single and 4 double annealing furnaces, three 26 x 38-inch, six 24½ x 38-inch, and one 23 x 37-inch hot sheet mills, and one 23 x 50-inch and three 24 x 44-inch cold mills; product, steel sheets; annual capacity, 32,500 net tons. Fuel, natural gas and coal. (Formerly called the Kirkpatrick Works and operated by the American Sheet Steel Company.)

Midland Works, Muncie, Delaware county, Indiana. Built in 1892 and first put in operation October 10, 1892; 6 pair, 6 sheet, 12 single annealing, one continuous billet, and 2 softening furnaces, one 2-high 26 x 56-inch plate mill, one 3-high 26-inch bar mill, six 26 x 40-inch hot sheet mills, and 4 cold mills (one 24 x 50, one 22 x 48, and two 22 x 44-inch); product, sheet bars and stamping sheets; annual capacity, 25,000 gross tons of sheet bars and 26,750 net tons of sheets and plates. Fuel, natural gas exclusively. (Formerly operated by the American Sheet Steel Company. Two 30-gross-ton open-hearth steel furnaces dismantled in 1901.)

Monongahela Works, South Fifteenth st., Pittsburgh, Pa. Built in 1894–5 and first put in operation February 14, 1895; 8 sheet and 8 pair furnaces, 4 annealing furnaces, and eight 26 x 32-inch hot and eight 20 x 32-inch cold mills; product, black plates for tinning; annual capacity, 18,000 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Morewood Works, Gas City, Grant county, Indiana. Built in 1892–3 and first put in operation in December, 1893; 8 sheet and 8 pair furnaces, 3 annealing furnaces, and 8 hot and 8 pairs of cold mills; product, black plates for tinning; annual capacity, 16,000 gross tons. Fuel, natural gas. Make tinplates. Iron and brass foundries are connected with the works. (Formerly operated by the American Tin Plate Company.)

National Works, Monessen, Westmoreland county, Pa. Built in 1897–8 and first put in operation in January, 1898; 24 sheet and 24 pair furnaces, 9 annealing furnaces, and twenty-four 26 x 32-inch hot and twenty 22 x 32-inch cold mills; product, black plates for tinning; annual capacity, 85,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

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 and twenty-one 20 x 22-inch cold mills; product, black plates for tinning; annual capacity, 40,000 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

New Philadelphia Works, New Philadelphia, Tuscarawas county, 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 26 x 48, four 26 x 38, two 24 x 38, and two 26 x 34-inch,) one 28 x 60-inch plate 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, 35,000 net tons. Fuel, coal. (Formerly operated by the American Sheet Steel Company.)

Pennsylvania Works, New Kensington, Westmoreland county, Pa. Built in 1894 and first put in operation in 1895; 6 sheet and 6 pair furnaces, 3 annealing furnaces, 6 hot mills, (four 26 x 32, one 26 x 30, and one 26 x 36-inch,) and 6 cold mills (four 22 x 34, one 22 x 38, and one 22 x 40-inch); product, black plates for tinning; annual capacity, 14,000 gross tons. Fuel, coal. Make tinplates. (Formerly operated by the American Tin Plate Company.)

Piqua Works, Piqua, Miami county, Ohio. Built in 1889; 4 combination pair and sheet furnaces, 5 single annealing furnaces, 2 pile furnaces, 5 single puddling furnaces, one 3-high 23-inch bar mill, 4 hot sheet mills, (one 26 x 40, one 26 x 36, one 24 x 36, and one 24 x 34-inch,) and one 22 x 42-inch cold mill; product, sheet bars and iron and steel sheets; annual capacity, 15,000 gross tons of sheet bars and 12,000 net tons of sheets. Fuel, nat-

ural gas and coal. (Formerly operated by the American Sheet Steel Company.)

Pittsburgh Works, New Kensington, Westmoreland county, Pa. Built in 1894 and first put in operation in December, 1894; 7 sheet and 7 pair furnaces, one double annealing furnace, 7 hot mills, (five 26 x 30, one 26 x 33, and one 27 x 33-inch,) and 7 cold mills (two 22 x 32, four 22 x 36, and one 22 x 40-inch); product, black plates for tinning and soft stamping sheets; annual capacity, 15,600 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Saltsburg Works, Saltsburg, Indiana county, 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 38-inch hot sheet mills, and 2 cold mills (one 24 x 44 and one 24 x 40-inch); product, fine sheet iron; annual capacity, 12,500 net tons. Fuel, natural gas and coal. (Formerly operated by the American Sheet Steel Company.)

Scottdale Works No. 1, Scottdale, Westmoreland county, Pa. Built in 1873 and remodeled in 1894 and 1897; 7 pair and 9 sheet furnaces, 7 double annealing furnaces, 9 hot mills, (two 24 x 44, one 24 x 40, and six 22 x 40-inch,) and 3 cold mills (one 22 x 44 and two 22 x 40-inch); product, black steel sheets; annual capacity, 27,500 net tons. Fuel, natural gas, coal, and coke. (Formerly called the Scottdale Works and operated by the American Sheet Steel Company.)

Scottdale Works No. 2, Scottdale, Westmoreland county, 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, one 26 x 44, and six 24 x 38-inch,) and 3 cold mills (one 28 x 56 and two 24 x 44-inch); product, sheet iron; annual capacity, 27,500 net tons. Fuel, natural gas and coal. (Formerly called the Old Meadow Works and operated by the American Sheet Steel Company.)

Sharon Works, Sharon, Pa. Built in 1901–3; not yet put in operation; 10 pair and 10 sheet furnaces, 3 double annealing furnaces, 10 hot sheet mills, (one 28 x 48, one 28 x 42, and eight 28 x 38-inch,) and 6 cold mills (two 22 x 54 and four 22 x 48-inch); product, black sheets; annual capacity, 30,000 net tons. Fuel, coal and producer gas. (Partly built by the Sharon Sheet Steel Company; completed and now owned by the Union Steel Company.) —*See page 23.*

Sharon Works, 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-inch hot mills, and 15 sets of 22-inch cold mills; product, black plates for tinning; annual capacity, 45,000 gross tons. Fuel, manufactured gas and coal. Make tin-

plates. (Formerly operated by the Sharon Tin Plate Company; later by the American Tin Plate Company; now owned by the Union Steel Company.)—*See page 23.*

Shenango Works, New Castle, Pa. Built in 1897–8 and first put in operation in April, 1899; 30 sheet and 30 pair furnaces, 8 annealing furnaces, and thirty 26 x 32-inch hot and thirty 22 x 34-inch cold mills; product, black plates for tinning; annual capacity, 60,000 gross tons. Fuel, coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Star Works, foot of Twelfth st., Pittsburgh, Pa. Built in 1895 and first put in operation January 6, 1896; 8 sheet and 8 pair furnaces, 9 annealing furnaces, and eight 26 x 32-inch hot and 8 cold mills (four 22 x 36 and four 22 x 32-inch); product, black plates for tinning; annual capacity, 18,000 gross tons. Fuel, bituminous coal and gas. Make tinplates. (Formerly operated by the American Tin Plate Company.)

Struthers Works, Struthers, Mahoning county, 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, (two 26 x 40, one 26 x 38, two 24 x 40, and one 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, 17,500 net tons. Fuel, coal. (Formerly operated by the American Sheet Steel Company.)

United States Works, Demmler, (eighth ward, McKeesport,) Pa. Built in 1873–4; burned and rebuilt in 1883; 11 sheet, 11 pair, and 6 annealing furnaces, 11 hot mills, (two 25 x 34, one 25 x 40, and eight 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, refined and cold-rolled black sheet iron, Bessemer and open-hearth steel sheets, and black plates for tinning; annual capacity, 25,000 gross tons. Fuel, bituminous coal. Make tin and terne plates. (Formerly operated by the American Tin Plate Company.)

Vandergrift Works, Vandergrift, Westmoreland county, Pa. Built in 1895–6 and put in partial operation in October, 1895; 21 pair and 21 sheet furnaces, 8 combination sheet and pair furnaces, 18 double annealing furnaces, eight 30-gross-ton acid open-hearth furnaces, four 4-hole soaking pits, 29 hot sheet mills, (one 26 x 56, three 26 x 52, six 26 x 44, and nineteen 26 x 40-inch,) 14 cold mills, (two 26 x 56, one 24 x 56, one 24 x 48, two 24½ x 47, one 24½ x 44, one 24½ x 42, three 26 x 44, two 26 x 40, and one 24 x 38-inch,) one 2-high 16-inch bar mill, one 26½ x 34-inch blooming mill, one stand of 2-high rolls, and 18 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, 200,000 gross tons of ingots, 160,000 gross tons of sheet bars, 95,000 net tons of black sheets, and 150,000 net tons of galvanized sheets. Fuel, natural gas, coal, and producer gas. Brand, "Apollo." (Formerly called the Vandergrift Steel Works and operated by the American Sheet Steel Company.)

Wellsville Works, Wellsville, Columbiana county, Ohio. Mill built in 1873 to make tinplates; remodeled in 1880; 10 pair and 10 sheet furnaces, 26 single annealing furnaces, one pile furnace, 10 hot sheet mills, (one 26 x 50, five 26 x 44, two 24 x 44, one 24 x 40, and one 24 x 34-inch,) 13 cold mills, (two 24 x 48 and eleven 24 x 38-inch,) and one 3-high 26-inch bar mill; product, light plate and sheet iron and highly finished sheet steel; annual capacity, 20,000 gross tons of sheet bars and 30,000 net tons of light plates and sheets. Fuel, natural gas. (Formerly operated by the American Sheet Steel Company.)

Wood's Works, McKeesport, Pa. Built in 1851; 16 forge fires, 2 refining fires, 28 annealing furnaces, 19 pair furnaces, 16 sheet furnaces, 7 slab furnaces, 2 softening furnaces, 24 heating furnaces, two 20-inch bar mills, 16 sheet mills, 4 cold mills, one 3-high plate mill, and 8 hammers; open-hearth steel department, built in 1889–90, contains two 15-gross-ton acid open-hearth steel furnaces; product, light plates and sheet iron and sheet steel, both black and planished; specialty, patent planished sheet iron; annual capacity, 22,500 gross tons of ingots, 30,000 gross tons of sheet bars, and 52,500 net tons of sheets. Fuel, natural gas, manufactured gas, and coal. Charcoal refinery fires for the manufacture of blooms are connected with the works; 16 knobbling fires; annual capacity of blooms, 10,500 gross tons. Trade-mark, a Russian bear in the talons of an American eagle. (Formerly called the McKeesport Works and operated by the American Sheet Steel Company.)

Total annual capacity of the 41 rolling mills and steel works: open-hearth ingots, 222,500 gross tons; large and small sheet bars, 275,000 gross tons; hammered blooms, 10,500 gross tons; muck bar, 23,000 gross tons; black sheets and plates, 625,250 net tons; black plates or sheets for tinning, stamping, etc., 571,700 gross tons; and galvanized sheets, 202,500 net tons.

TINPLATE AND TERNE PLATE WORKS—19.

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

American Works, Elwood, Madison county, 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. (Formerly operated by the American Tin Plate Company.)

Anderson Works, Anderson, Madison county, Indiana. Built in 1894–5 and first tin and terne plates made in August, 1895; 12 sets; weekly capacity, 6,500 base boxes of tinplates. Fuel, natural gas. Make black plates. (Formerly operated by the American Tin Plate Company.)

Beaver Works, Lisbon, Columbiana county, Ohio. Built in 1894–5 and first tin and terne plates made in April, 1895; 14 sets; weekly capacity, 6,000 boxes of tin and terne plates. Fuel, bituminous coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Chester Works, Chester, Hancock county, West Virginia. Post office address, East Liverpool, Ohio. 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. (Formerly operated by the American Tin Plate Company.)

Crescent Works, Cleveland, Ohio. Built in 1894–5 and first tin and terne plates made in January, 1896; 11 sets for tin and terne plates; weekly capacity, 5,400 boxes. Fuel, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Falcon Works, Niles, Trumbull county, 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. (Formerly operated by the American Tin Plate Company.)

Humbert Works, South Connellsville, Fayette county, Pa. Built in 1896 and first tinplates made December 4, 1896; 12 sets for tin and terne plates; weekly capacity, 6,000 boxes. Fuel, natural gas. Make black plates. (Formerly operated by the American Tin Plate Company.)

La Belle Works, Wheeling, West Virgina. 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, 9,000 boxes of tinplates. Fuel, natural gas. Do not now make terne plates. Make black plates. (Formerly operated by the American Tin Plate Company.)

Laughlin Works, Martins Ferry, Belmont county, 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; 46 sets for tin and terne plates; weekly capacity, 20,000 boxes. Fuel,

coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Monongahela Works, South Fifteenth st., Pittsburgh, Pa. Built in 1893; first terne plates made June 1 and first tinplates November 15, 1893; 18 sets, 17 for tin and one for terne plates; weekly capacity, 10,000 boxes. Fuel, natural gas and coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Morewood Works, Gas City, Grant county, Indiana. Built in 1893; first terne plates made in June and first tinplates in December, 1893; 13 sets; weekly capacity, 7,000 base boxes of tinplates. Fuel, natural gas. Make black plates. (Formerly operated by the American Tin Plate Company.)

National Works, Monessen, Westmoreland county, Pa. Built in 1897–8 and first tin and terne plates made in March, 1898; 45 sets for tin and terne plates; weekly capacity, 27,000 boxes. Fuel, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

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, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Pennsylvania Works, New Kensington, Westmoreland county, Pa. Built in 1895 and first tin and terne plates made in April, 1895; 12 sets for tinplates; weekly capacity, 6,000 boxes. Fuel, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Pittsburgh Works, New Kensington, Westmoreland county, Pa. Built in 1891–2 and first terne plates made in February and first tinplates in October, 1892; 12 sets for tin and terne plates; weekly capacity, 5,500 boxes. Fuel, bituminous coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Sharon Works, Sharon, Pa. Built in 1900–1 and first tinplates made in July, 1901; 24 sets; weekly capacity, 18,000 boxes of tinplates. Fuel, coal. Make black plates. (Formerly operated by the Sharon Tin Plate Company; later by the American Tin Plate Company; now owned by the Union Steel Company.)—*See page 23.*

Shenango Works, New Castle, Pa. Built in 1897–8 and first tin and terne plates made in July, 1899; 42 sets for tin and terne plates; weekly capacity, 30,000 boxes. Fuel, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Star Works, foot of Twelfth st., Pittsburgh, Pa. Built in 1895; 14 sets for tinplates; weekly capacity, 6,000 boxes. Fuel, natural

gas. Make black plates. (Formerly operated by the American Tin Plate Company.)

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; 14 sets for tin and terne plates; weekly capacity, 7,000 boxes. Fuel, coal. Make black plates. (Formerly operated by the American Tin Plate Company.)

Total weekly capacity of the 19 tinplate and terne plate works on double turn: 232,100 boxes of 100 pounds.

BRANDS FOR TINPLATES AND TERNE PLATES.

Coke Tinplates—American, American Best, and American Extra Cleaned.

Charcoal Tinplates—American "A," American "AA," American "AAA," American "AAAA," American "AAAAA," "Premier," and American Dairy Tin.

Terne Plates—American, American Extra, American Special, American Old Style "A," American Old Style "AA," American Old Style "AAA," American Old Style "AAAA," American Old Style "AAAAA," "M. F.," "U. S. Eagle N. M.," American Numethodd "B," American Numethodd "D," American Numethodd "F," American Long Ternes, American Extra Long Ternes, American Special Long Ternes, American Old Style "A" Long Ternes, American Old Style "AA" Long Ternes, American Old Style "AAA" Long Ternes, American Old Style "AAAA" Long Ternes, and American Old Style "AAAAA" Long Ternes.

Continuous Roofing Plates—American Continuous Roofing, American Extra Continuous Roofing, American Special Continuous Roofing, American Old Style "A" Continuous Roofing, American Old Style "AA" Continuous Roofing, American Old Style "AAA" Continuous Roofing, American Old Style "AAAA" Continuous Roofing, and American Old Style "AAAAA" Continuous Roofing.

IRON AND BRASS FOUNDRIES.

Morewood Works, Gas City, Indiana. One iron and one brass foundry; product, castings for mill maintenance; annual capacity, 3,000 gross tons of iron and brass castings. (Formerly operated by the American Tin Plate Company.)

METAL LATHS.

Dover Works, Canal Dover, Ohio. Product, Cambridge rigid reversible metal laths; annual capacity, 4,000 net tons. (Formerly operated by the American Sheet Steel Company.)

GALVANIZING WORKS—3 ACTIVE AND 1 IDLE.

Cambridge Works, Cambridge, Ohio. Number of pots, 5; product, Apollo galvanized sheets; annual capacity, 37,500 net tons. (Formerly operated by the American Sheet Steel Company.)

Dover Works, Canal Dover, Ohio. Number of pots, 3; product; Apollo galvanized sheets; annual capacity, 15,000 net tons. (Formerly operated by the American Sheet Steel Company.)

Piqua Works, Piqua, Ohio. Number of pots, 1; annual capacity; 6,500 net tons. (Formerly operated by the American Sheet Steel Company.)—*Idle.*

Vandergrift Works, Vandergrift, Pa. Number of pots, 18; product; Apollo galvanized sheets; annual capacity, 150,000 net tons. (Formerly operated by the American Sheet Steel Company.)

Total annual capacity of the 3 active works, 202,500 net tons; of the idle works, 6,500 net tons: total, 209,000 tons.

COAL LANDS, RAILROADS, COPPERAS PLANTS, ETC.

The company owns 2,085 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 74.) 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, Tuscarawas county, Ohio. It also owns a plant at Elwood, Madison county, Indiana, which manufactures copperas and which has an annual capacity of 2,500 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 office, 51 Newark st., Hoboken, New Jersey; Pittsburgh office, Frick Building; New York office, 100 Broadway. *Officers at Pittsburgh:* Alfred J. Major, President; Charles C. Price, Auditor; William H. Connell, Treasurer; Paul L. Wolfel, Chief Engineer; James Christie, Mechan-

ical 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—1.

Pencoyd Iron Works, A. and P. Roberts Company, operators; general offices, Pennsylvania Building, Fifteenth and Chestnut sts., Philadelphia. Works in Montgomery county, opposite Manayunk, 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 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. *Officers:* Charles Major, President, James Christie, Vice-President, and W. C. Smith, Secretary and Treasurer, Pennsylvania Building, Philadelphia.

Total annual capacity of the rolling mills and steel works: open-hearth ingots, 230,000 net tons; finished products, 200,000 tons.

PROJECTED STEEL-CASTING PLANT.

Ambridge Plant, Ambridge, Beaver county, Pa. One 10-gross-ton open-hearth furnace for the manufacture of steel castings may be erected in the summer of 1904.

BRIDGEBUILDING WORKS—20.

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

Ambridge Plant, Ambridge, Beaver county, Pa. Annual capacity, from 180,000 to 240,000 tons. Also builds steel barges. An iron and steel foundry will be added to these works.

American Plant, Fortieth st. and Stewart ave., Chicago, Illinois.

Annual capacity, 24,000 tons. Also makes car and locomotive axles, shafting, and other forgings. (Formerly called the American Bridge Works.)

Athens Plant, Athens, Bradford county, Pa. Annual capacity, 15,000 tons. (Formerly called the Union Bridge Works.)

Berlin Plant, East Berlin, Hartford county, Conn. Annual capacity, 18,000 tons. (Formerly called the Berlin Iron Bridge Works.)

Canton Plant, Dueber ave. and Bridge st., Canton, Stark county, Ohio. Annual capacity, 12,000 tons. (Formerly called the Wrought Iron Bridge Works.)

Columbus Plant, Curtis and Jefferson aves., Columbus, Franklin county, Ohio. Annual capacity, 4,800 tons. (Formerly called the New Columbus Bridge Works.)

Detroit Plant, Beecher ave. and M. C. R. R., Detroit, Michigan. Annual capacity, 16,800 tons. (Formerly called the Detroit Bridge and Iron Works.)

Edge Moor Plant, Edge Moor, New Castle county, Delaware. Annual capacity, 30,000 tons. (Formerly called the Edge Moor Bridge Works.)

Keystone Plant, Fifty-first st. and A. V. Ry., Pittsburgh. Annual capacity, 48,000 tons. (Formerly called the Keystone Bridge Works.)

Lafayette Plant, Lafayette, Tippecanoe county, Indiana. Annual capacity, 3,600 tons. (Formerly called the Lafayette Bridge Works.)

Lassig Plant, Clybourn and Wrightwood avenues, Chicago, Illinois. Annual capacity, 54,000 tons. (Formerly called the Lassig Bridge and Iron Works.)

Milwaukee Plant, Seventeenth st. and St. Paul avenue, Milwaukee, Wisconsin. Annual capacity, 12,000 tons. (Formerly called the Milwaukee Bridge and Iron Works.)

Minneapolis Plant, Seventh ave. and Second st. Southeast, Minneapolis, Minnesota. Annual capacity, 16,800 tons. (Formerly operated by the Gillette-Herzog Manufacturing Company.)

Pencoyd Plant, Pencoyd, Montgomery county, Pa. Annual capacity, 84,000 tons. This plant contains equipment for all classes of bridge and architectural work; also standard railroad turntables; also a hydraulic forge shop for the manufacture of solid forged steel eyebars from 3 to 12 inches wide.

Schultz Plant, McKees Rocks, Allegheny county, Pa. Annual capacity, 9,000 tons. (Formerly operated by the Schultz Bridge Iron Company.)

Shiffler Plant, Forty-eighth st. and A. V. Ry., Pittsburgh, Pa. Annual capacity, 24,000 tons. (Formerly called the Shiffler Bridge Works.)

Toledo Plant, East Broadway and L. S. & M. S. Ry., Toledo, Lucas

county, Ohio. Annual capacity, 36,000 tons. (Formerly called the Toledo Bridge Works.)

Trenton Plant, foot of Warren st.; Trenton, New Jersey. Annual capacity, 36,000 tons. Also makes chains. (Formerly called the Trenton Iron Works.)

Walker Plant, West Homestead, Allegheny county, Pa. Annual capacity, 16,800 tons. (Formerly operated by the Shiffler Bridge Company.)

Youngstown Plant, Haselton, Youngstown, Ohio. Annual capacity, 14,400 tons. (Formerly called the Youngstown Bridge Works.)

Total annual capacity of the 20 iron and steel bridgebuilding plants: from 655,200 tons to 715,200 net tons.

BOLT AND RIVET WORKS.

All the bridgebuilding plants named above make bolts and rivets.

STEEL SHIPBUILDING YARDS.

Ambridge Plant, Ambridge, Pa. Product, steel barges, chiefly for river use.

IRON AND STEEL CHAIN WORKS.

Trenton Plant, foot of Warren st.; Trenton, N. J. Product, iron cable and other chains for the use of the company and for sale; sizes, up to 1¾ inches inclusive. (Formerly called the Trenton Iron Works and operated by the New Jersey Steel and Iron Company.)

CAR-AXLE WORKS.

American Plant, Fortieth st. and Stewart ave., Chicago. Product, hammered car and locomotive axles; annual capacity, 62,000 axles. (Formerly operated by the Chicago Forge and Bolt Company.)

IRON AND STEEL FORGING WORKS—4.

Ambridge Plant, Ambridge, Pa. Product, solid forged steel eyebars from 2 to 14 inches wide for use in the bridgebuilding department of the plant; annual capacity, 15,000 tons.

American Plant, Fortieth st. and Stewart ave., Chicago, Ill. Product, shafting, axles, and other forgings; annual capacity, not including axles, 1,200 tons. (Formerly operated by the Chicago Forge and Bolt Company.)

Athens Plant, Athens, Pa. Product, solid steel forged eyebars from 2 to 12 inches wide for use in the bridgebuilding department of the plant; annual capacity, 3,600 tons. (Formerly operated by the Union Bridge Company.)

Pencoyd Plant, Pencoyd, Pa. Product, solid forged steel eyebars from 3 to 12 inches wide for use in the bridgebuilding department of the plant; annual capacity, 4,500 tons.

Total annual capacity of the 4 plants: 24,300 gross tons.

IRON, BRASS, AND STEEL FOUNDRIES.

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

Keystone Plant, Fifty-first st. and A. V. Ry., Pittsburgh, Pa. Product, general iron castings; annual capacity, 4,800 tons.

Minneapolis Plant, Seventh ave. and Second st. Southeast, Minneapolis, Minn. Product, general iron castings; annual capacity, 2,400 tons.

Pencoyd Iron Works, A. and P. Roberts Company, operators, Pennsylvania Building, Philadelphia. Works at Pencoyd, Pa. Product, general iron, brass, and steel castings; annual capacity, 2,400 tons of iron, 100 tons of brass, and 4,000 tons of steel castings.

Total annual capacity of the foundries: 10,200 gross tons of iron, 100 tons of brass, and 4,000 tons of steel castings.

EMPIRE BRIDGE COMPANY.

Empire Bridge Company; principal office, Horseheads, Chemung county, New York. New York office, 100 Broadway; Pittsburgh office, Frick Building. *Officers:* Alfred J. Major, President, William H. Connell, Treasurer, Charles C. Price, Auditor, and R. F. Ball, Assistant Auditor, Pittsburgh; Henry Schoonmaker, Secretary, and W. deSaussure Trenholm, Assistant Secretary, New York; Paul L. Wolfel, Chief Engineer, W. G. A. Millar, Purchasing Agent, and Charles S. Belsterling, Traffic Manager, Pittsburgh. The company operates the following works:

BRIDGEBUILDING AND BOLT AND RIVET WORKS—4.

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

Albany Plant, Albany, Albany county, New York. Annual capacity, 4,800 tons. (Formerly called the Hilton Bridge Works.)

Brooklyn Plant, foot of Clay st., Brooklyn, New York. Annual capacity, 30,000 tons. (Formerly called the Post & McCord Works.)

Buffalo Plant, Bailey ave. and L. V. Ry., Buffalo, New York. Annual capacity, 7,200 tons. (Formerly called the Buffalo Bridge and Iron Works.)

Elmira Plant, East Miller st., Elmira, Chemung county, New York. Annual capacity, 31,800 tons. (This plant includes the North and South shops, at Elmira, and the Horseheads shops, at Horseheads. The former plant was known as the Elmira Bridge Works and the latter plant as the Horseheads Bridge Works.)

Total annual capacity of the 4 bridgebuilding plants described above: 73,800 tons.

AMERICAN BRIDGE COMPANY OF NEW YORK.

American Bridge Company of New York; principal office, No. 100 Broadway, New York; Pittsburgh office, Frick Building. *Officers:* Joshua A. Hatfield, President, New York; August Ziesing, Vice-President, Monadnock Block, Chicago; Edwin J. Odgen, Vice-President, Charles C. Price, Auditor, and William H. Connell, Treasurer, Pittsburgh; W. C. Smith, Assistant Treasurer, Philadelphia; Henry Schoonmaker, Secretary, and W. deSaussure Trenholm, Assistant Secretary, New York; S. P. Mitchell, Chief Engineer, W. G. A. Millar, Purchasing Agent, and Charles S. Belsterling, Traffic Manager, Pittsburgh.

Branch offices in the United States: 291 St. John st., Portland, Maine; Fiske Building, 89 State st., Boston, Massachusetts; East Berlin, Connecticut; Pennsylvania Building, Fifteenth and Chestnut sts., Philadelphia; 906 Cathedral st., Baltimore, Maryland; 209 Kellogg st., Syracuse, New York; Frick Building, Pittsburgh; Ellicott Square Building, Buffalo, New York; Chamber of Commerce Building, Cleveland, Ohio; Monadnock Block, Chicago, Illinois; Second st. and Sixth ave., Minneapolis, Minn.; Hennen Building, New Orleans, Louisiana; Postal Telegraph Building, Kansas City, Missouri; Jackson Block, Denver, Colorado; Dooley Block, Salt Lake City, Utah; Crocker Building, San Francisco, California; Bailey Building, Seattle, State of Washington; English-American Building, Atlanta, Georgia; and the Union Trust Building, Cincinnati, Ohio.

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.

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, Frick Building, Pittsburgh, Pennsylvania. *Officers on April 29, 1904:* W. P. Snyder, President; Frank B. Smith, Vice-President; Julius Bieler, Treasurer; George L. Brown, Secretary and Assistant Treasurer; and George G. Thorp, General Superintendent. The Clairton Steel Company operates the following works:

BLAST FURNACES—3.

Clairton Furnaces, Clairton, Allegheny county, 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 blown in June 14, 1903, and No. 3 not blown in down to April 30, 1904; twelve Massicks & Crooke stoves, each 95 x 21; fuel, coke; ore, Mesabi and old range from Minnesota and Michigan; product, Bessemer pig iron; total annual capacity, 475,000 tons.—*Active in 1903.*

Total annual capacity of the 3 furnaces: 475,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1.

Clairton Steel Works, Clairton, Allegheny county, 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; annual capacity, 35,000 tons of acid and 365,000 tons of basic ingots; 20 soaking pits and 2 trains of rolls (one 40-inch blooming and one 28-inch billet); product, billets, blooms, and slabs; annual capacity, 325,000 tons. Fuel, natural gas in open-hearth furnaces and soaking pits and bituminous coal under boilers.

Total annual capacity of the works: 365,000 gross tons of basic open-hearth steel ingots, 35,000 tons of acid open-hearth steel ingots, and 325,000 tons of billets, blooms, and slabs.

COAL AND IRON-ORE LANDS.

The Clairton Steel Company owns 2,644 acres of undeveloped coal land in Fayette county, Pa.

It also owns a one-half interest in the Clairton iron-ore mine in St. Louis county, Minnesota, the Champion mine, at Champion, Marquette county, Michigan, and the Day property in Itasco county, Minnesota. The Clairton and Champion mines are in operation.

RAILROADS AND LIMESTONE QUARRIES.

The company also owns the St. Clair Terminal Railroad Company, which operates 1.7 miles of railroad at Clairton. This company owns 7 locomotives, one passenger car, and 106 freight, road, and other cars.

The Clairton Steel Company also owns 51 per cent. of the stock of the St. Clair Limestone Company, which owns $25\frac{4}{10}$ acres of limestone lands in Blair county, Pennsylvania, on which quarries with an annual capacity of 280,000 tons of limestone are located.

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 Pennsylvania,) 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, Westmoreland county, Pa. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; Philip Keller, Treasurer; C. P. Parker, Auditor; and W. H. Clingerman, General Superintendent.

Capital stock, $20,000,000, all common. The company operates or controls the following coke plants, all located in Pennsylvania:

COKE WORKS—56.

Allegheny County—Youghiogheny Works, 189 ovens; annual capacity, 129,000 net tons.

Fayette County—Adelaide Works, 375 ovens; Buffington, 400; Coalbrook, 120; Continental No. 1, 400; Continental No. 2, 300; Continental No. 3, 300; Davidson, 333; Eagle, 80; Edenborn, 500; Footedale, 400; Foundry, 97; Frick, 105; Henry Clay, 120; Kyle, 306; Lambert, 432; Leckrone, 516; Leisenring No. 1, 500; Leisenring No. 2, 500; Leisenring No. 3, 504; Leith, 308; Lemont No. 1, 227; Lemont No. 2, 350; Morgan, 165; Oliphant, 252; Redstone, 445; Sterling No. 2, 294; Summit, 142; Trotter, 464; White, 200; Wyn, 130; and Youngstown, 242.

Total in Fayette county: 31 coke plants; 9,507 ovens; annual capacity, 6,483,000 net tons.

Westmoreland County—Alverton No. 1 Works, 252 ovens; Alverton No. 2, 104; Baggaley, 400; Bessemer, 273; Buckeye, 306; Calumet, 260; Central, 303; Dorothy, 230; Enterprise, 51; Mammoth, 510; Marguerite, 400; Mullin, 82; Mutual, 195; Mutual No. 4, 240; Monastery, 208; Painter, 228; Southwest No. 1, 625; Southwest No. 2, 252; Southwest No. 3, 205; Southwest No. 4, 151; Standard, 901; Tip Top, 121; United, 350; and Valley, 251.

Total in Westmoreland county: 24 coke plants; 6,898 ovens; annual capacity, 4,840,000 net tons.

Grand total: 56 coke plants; 16,594 ovens; annual capacity, 11,452,000 net tons.

In addition the company owns 305 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 Company owns or controls about 57,000 acres of coal land, 18,000 acres of surface land, and 2,060 railroad cars. It operates the Smiley coal mines, at Smiley 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, engines, boilers, etc.

THE YOUGHIOGHENY NORTHERN RAILWAY COMPANY.

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

The line of the Youghiogheny Northern Railway Company extends from Broad Ford to Summit, Fayette county, Pa., about 2.4 miles. The line is leased and operated by the Pittsburgh, McKeesport, and Youghiogheny Railway Company.

YOUGHIOGHENY WATER COMPANY.

Youghiogheny Water Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; and Philip Keller, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The plant of this company is located at Broad Ford, Fayette county, Pa., and has a daily pumping capacity of 2,000,000 gallons of water, which is supplied to coke works, manufacturing establishments, railroads, and for domestic consumption in Upper Tyrone and Connellsville townships, in Fayette county.

TROTTER WATER COMPANY.

Trotter Water Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; and Philip Keller, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

The works of this company are located on the Youghiogheny river, 1½ miles above Connellsville, Pa., and supply water to coke works, railroads, manufacturing establishments, and for public consumption generally in Dunbar, North Union, and Franklin townships in Fayette county. The pumping capacity is 5,000,000 gallons daily.

MOUNT PLEASANT WATER COMPANY.

Mount Pleasant Water Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; D. H. Coble, Secretary; and Philip Keller, Treasurer. 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 750,000 tons of coal for heating and steam raising purposes.

RIVER COAL COMPANY.

River Coal Company; general offices, Carnegie Building, Pittsburgh, Pa. *Officers:* Thomas Lynch, President; D. H. Coble, Vice-President; and J. L. Lowther, Secretary and Treasurer. All the capital stock of this company is owned by the Union Steel Company.

The company owns 1,500 acres of coal lands in Fayette county, Pa., the development of which has just been commenced.

SHARON COAL AND LIMESTONE COMPANY.

Sharon Coal and Limestone Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; C. P.

Parker, Secretary and Treasurer; and C. F. Miller, Auditor. Two-thirds of the capital stock of this company is owned by the Union Steel Company.

The Sharon Coal and Limestone Company owns 7,157 acres of coal and limestone property in Butler, Mercer, and Lawrence counties in the State of Pennsylvania.

SHARON COKE COMPANY.

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

The Sharon Coke Company owns 1,458 acres of coking coal lands at Masontown, Fayette county, Pennsylvania, and has 212 completed Otto-Hoffman retort coke ovens. The company has a daily capacity of about 1,200 tons of coke.

REPUBLIC COKE COMPANY.

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

The Republic Coke Company owns 3,222 acres of undeveloped coal land and 511 acres of surface land in Fayette county, Pa.

MINGO COAL COMPANY.

Mingo Coal Company; general offices, Carnegie Building, Pittsburgh, Pa. *Officers:* Thomas Lynch, President, and W. W. Blackburn, Secretary and Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company owns 13,093 acres of undeveloped coal and 15 acres of surface land in Washington county, Pennsylvania.

UNITED STATES COAL AND COKE COMPANY.

United States Coal and Coke Company; general offices, Carnegie Building, Pittsburgh. *Officers:* Thomas Lynch, President; C. P. Parker, Secretary and Treasurer; and Jared M. B. Reis, Assistant to President. All the capital stock of this company is owned by the Illinois Steel Company.

This company leases 50,000 acres of coal lands in McDowell county, West Virginia, on which it has 956 completed bee-hive coke ovens, with an annual capacity of 600,000 net tons of coke.* In addition it had under construction on December 31, 1903, 824 bee-hive coke ovens. Additional ovens are to be erected.

OLIVER IRON MINING COMPANY.

Five-sixths of the stock of the Oliver Iron Mining Company is owned by the Carnegie Steel Company (of New Jersey) and one-sixth by the United States Steel Corporation.

Oliver Iron Mining Company; general offices, Duluth, Minnesota. New York office, 71 Broadway. *Officers at Duluth:* Thomas F. Cole, President; W. J. Olcott, General Manager; Nelson P. Hulst, Vice-President; L. W. Powell, Assistant to President; George D. Swift, Assistant Secretary and Assistant Treasurer; and W. M. Jeffery, Auditor. *Officers at New York:* C. D. Fraser, Secretary, and Charles E. Scheide, Treasurer. Capital stock, $1,200,000, all common.

This company owns all the stock of the Security Land and Exploration Company, 75 per cent. of the stock of the Lake Superior Iron Company, and 75 per cent. of the stock of the Regent Iron Company.

It also holds in fee or by lease various iron-ore properties in the Vermilion, Mesabi, Gogebic, Marquette, and Menominee Ranges in the Lake Superior region, producing about 30 per cent. of the entire ore yield of that district. The shipments from the mines owned, operated, or controlled by the company amounted in 1903 to about 7,000,000 tons. The Oliver Iron Mining Company operates under operating agreements the active mining properties of the Chapin Mining Company, the Winthrop Iron Company, the Sharon Ore Company, the Donora Mining Company, the Lake Superior Consolidated Iron Mines, the Minnesota Iron Company, the American Mining Company, and the Cundy Iron Company. Descriptions of the properties of all these companies are given on the following pages.

CHAPIN MINING COMPANY.

Chapin Mining Company; general offices, Duluth, Minn.; branch office, 71 Broadway, New York. *Officers at Duluth:* T. F. Cole, President; N. P. Hulst, Vice-President; and W. J. Olcott, Gen-

eral Manager. *Officers at New York:* C. D. Fraser, Secretary, and C. E. Scheide, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company operates the Chapin iron-ore mine, in the Menominee Range, in Dickinson county, Michigan.

WINTHROP IRON COMPANY.

Winthrop Iron Company; general offices, Duluth, Minn.; branch office, 71 Broadway, New York. *Officers at Duluth:* T. F. Cole, President; N. P. Hulst, Vice-President; and W. J. Olcott, General Manager. *Officers at New York:* C. D. Fraser, Secretary, and C. E. Scheide, Treasurer. All the capital stock of this company is owned by the Carnegie Steel Company (of New Jersey).

This company operates the Winthrop iron-ore mine, in the Marquette Range, in Marquette county, Michigan.

SHARON ORE COMPANY.

Sharon Ore Company; general offices, Duluth, Minn.; branch office, 71 Broadway, New York. *Officers at Duluth:* T. F. Cole, President; N. P. Hulst, Vice-President; and W. J. Olcott, General Manager. *Officers at New York:* C. D. Fraser, Secretary, and C. 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, in St. Louis county, Minnesota.

DONORA MINING COMPANY.

Donora Mining Company; general offices, Duluth, Minn.; branch office, 71 Broadway, New York. *Officers at Duluth:* T. F. Cole, President; N. P. Hulst, Vice-President; and W. J. Olcott, General Manager. *Officers at New York:* C. D. Fraser, Secretary, and C. 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 Donora iron-ore mines in the Mesabi Range, in St. Louis county, Minn., and the Volunteer iron-ore mine in the Marquette Range, in Marquette county, Mich. In addition it owns about 1,900 acres of iron-ore lands in the Marquette Range, in Marquette county.

LAKE SUPERIOR CONSOLIDATED IRON MINES.

Lake Superior Consolidated Iron Mines; offices, 71 Broadway, New York, and Duluth, Minnesota. *Officers at New York:* James

Gayley, President; Thomas Murray, Vice-President; Charles D. Fraser, Secretary and Assistant Treasurer; and Charles E. Scheide, Treasurer. *Officers at Duluth:* George D. Swift, Assistant Secretary and Assistant Treasurer; W. M. Jeffery, Auditor; and W. J. Olcott, Superintendent of Mines.

Capital stock, $29,424,940.97, all common, and practically all owned by the United States Steel Corporation. The company owns the iron-ore properties named below, all of which are included in the list of mines printed on pages 79–80.

IRON-ORE MINES.

The iron-ore properties of the company are all located in the Mesabi Range, in the State of Minnesota. The active mines are as follows: Adams, Burt, Day, Duluth, Glen, Hull, Pillsbury, Rust, Sellers, and Spruce. In addition the company owns large tracts of explored but unopened iron-ore lands in the Mesabi Range which are held in reserve for future use. The company also owns the fee of the Biwabic mine, the mine being leased to the Biwabic Mining Company. It also owns several thousand acres of unexplored mineral lands in the Mesabi Range, much of which is located in the ore-bearing member.

RAILROADS.

The Lake Superior Consolidated Iron Mines own the entire capital stock of the Duluth, Missabe, and Northern Railway Company, which operates 131.97 miles of main line, 30.41 miles of branches and spurs, 24.48 miles of second track, and 68.14 miles of siding. Its road is equipped with 46 locomotives, 18 passenger cars, and 4,102 freight, road, and other cars.

MINNESOTA IRON COMPANY.

Minnesota Iron Company; general offices, Duluth, Minnesota. *Officers at Duluth:* Thomas F. Cole, President; Nelson P. Hulst, Vice-President and General Mining Engineer; W. J. Olcott, General Manager; George D. Swift, Assistant Secretary and Assistant Treasurer; W. M. Jeffery, Auditor; and J. L. Mullin, Assistant Auditor. *Officers at New York:* Charles E. Scheide, Treasurer, and C. D. Fraser, Secretary and Assistant Treasurer, 71 Broadway. Capital stock, $16,500,000, all common, and all owned by the Federal Steel Company.

The Minnesota Iron Company owns 150,300 acres of iron-ore mining lands in Minnesota and Michigan. It has seven mines, of which four are in operation, namely, Minnesota and Chandler, in the Vermilion Range, and Fayal and Genoa, in the Mesabi

Range, producing over 3,000,000 gross tons of iron ore annually. It also owns the entire capital stock and $3,500,000 of the second mortgage bonds of the Duluth and Iron Range Railroad Company, which has 395 miles of railroad track in the Lake Superior region and iron-ore docks on Lake Superior.

AMERICAN MINING COMPANY.

American Mining Company; general offices, Cleveland, Ohio. *Officer at Cleveland:* Wm. P. Palmer, President. *Officers at Chicago:* J. S. Keefe, Vice-President; A. F. Allen, Secretary; and F. L. Watson, Treasurer. All the capital stock of this company is owned by the American Steel and Wire Company of New Jersey.

CUNDY IRON COMPANY.

Cundy Iron Company; general offices, Rookery Building, Chicago. *Officers:* E. J. Buffington, President, and T. J. Hyman, Secretary and Treasurer. This company leases iron-ore lands in Michigan, which have an annual capacity of 250,000 tons. All its stock is owned by the Illinois Steel Company.

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 constituent companies of the United States Steel Corporation own several hundred thousand acres of land located in the mineral belts of Michigan and Minnesota.

MESABI RANGE.

Active Mines: Adams, Biwabik, (¼ interest,) Burt, Chisholm, Clark, Day, Donora, Duluth, Fayal, Genoa, Glen, Hull, Mahoning, (⅓ interest,) Morris, Mountain Iron, Pillsbury, Rust, St. Clair, Sellers, Sharon, Spruce, Stephens, Union, (½ interest,) and Virginia.

Idle Mines: Auburn, Penobscot, Sauntry, and Sweeny.

VERMILION RANGE.

Active Mines: Chandler, (½ interest,) Pioneer, Savoy, Sibley, Soudan, and Zenith.

GOGEBIC RANGE.

Active Mines: Atlantic, Aurora, Chicago, Norrie, and Tilden.

MENOMINEE RANGE.

Active Mines: Aragon, Chapin, Columbia, Cundy, Forest, Hope, Iron Ridge, Mansfield, Michigan, Pewabik, (½ interest,) and Riverton.
Idle Mines: Cuff and Hilltop.

MARQUETTE RANGE.

Active Mines: Bessie, Hard Ore, (¾ interest,) Hartford, Hematite Ore, (¾ interest,) Queen, (¾ interest,) Section 16, (¾ interest,) Section 21, (¾ interest,) Volunteer, and Winthrop.
Idle Mines: Moore and Stegmiller.

TOTAL PRODUCTION OF IRON ORE.

The total production of iron ore in the Lake Superior region by the subsidiary companies of the United States Steel Corporation is given below by ranges, in gross tons, for the calendar years 1902 and 1903. Production must not be confounded with shipments.

Ranges—Gross tons.	Year ending Dec. 31, 1902.	Year ending Dec. 31, 1903.
Marquette Range	1,487,370	1,412,402
Menominee Range	2,675,754	2,106,443
Gogebic Range	2,064,492	1,867,856
Vermilion Range	2,057,537	1,918,584
Mesabi Range	7,778,026	8,058,070
Total	16,063,179	15,363,355

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; principal office, Duluth, Minnesota; branch office, Cleveland, Ohio. *Officers at Cleveland:* H. Coulby, President and General Manager; A. F. Harvey, Assistant General Manager; and James H. Hoyt, Secretary. *Officers at Duluth:* L. W. Powell, Vice-President; George D. Swift, Assistant Treasurer; and W. M. Jeffery, Auditor. *Officer at New York:*

Charles E. Scheide, Treasurer, 71 Broadway. Capital stock, $1,310,000, all common. The Pittsburgh Steamship Company owns or operates the following steamships and barges:

STEAMSHIPS FORMERLY OPERATED BY THE AMERICAN STEEL AND WIRE COMPANY OF NEW JERSEY.

Steamships: Isaac L. Ellwood, James J. Hill, John W. Gates, Wm. Edenborn, Crescent City, Empire City, Queen City, Superior City, Zenith City, W. H. Gilbert, A. B. Wolvin, and Wm. P. Palmer.

Total, 12; annual ore-carrying capacity, based on an average of 19 trips each season, 1,252,100 tons.

STEAMSHIPS, WHALEBACKS, AND BARGES FORMERLY OPERATED BY THE BESSEMER STEAMSHIP COMPANY.

Steamships: Chas. R. Van Hise, Douglass Houghton, General O. M. Poe, Geo. Stephenson, James B. Eads, James Watt, John Ericsson, Rob't W. E. Bunsen, Robert Fulton, Sam'l F. B. Morse, Sir Henry Bessemer, Sir Wm. Fairbairn, Sir Wm. Siemens, James B. Neilson, and Henry Cort.

Barges: Alexander L. Holley, Alfred Krupp, Geo. H. Corliss, James Nasmyth, John A. Roebling, John Fritz, John Smeaton, Sidney G. Thomas, Sir I. L. Bell, W. Le B. Jenney, J. Scott Russell, and Sir J. Whitworth.

Whaleback Steamships: Alex. McDougall, A. D. Thomson, Colgate Hoyt, E. B. Bartlett, Frank Rockefeller, James B. Colgate, John B. Trevor, J. L. Colby, and Samuel Mather.

Whaleback Barges: 105, 107, 109, 110, 111, 116, 117, 118, 126, 127, 130, 131, 132, 133, 134, 137, 201, and 202.

Total, 24 steamers and 30 barges; annual ore-carrying capacity, based on an average of 19 trips each season, 4,343,400 tons.

STEAMSHIPS AND BARGES FORMERLY OPERATED BY THE MINNESOTA STEAMSHIP COMPANY.

Steamships: Malieto, Manola, Maricopa, Marina, Mariposa, Mariska, Maritana, Maruba, Masaba, Mataafa, Matoa, and Maunaloa.

Barges: Madeira, Magna, Maia, Maida, Malta, Manda, Manila, Marcia, Martha, and Marsala.

Total, 12 steamers and 10 barges; annual ore-carrying capacity, based on an average of 19 trips each season, 2,052,000 tons.

STEAMSHIPS AND BARGES ORIGINALLY OPERATED BY THE PITTSBURGH STEAMSHIP COMPANY.

Steamships: Lafayette, Princeton, Cornell, Harvard, Rensselaer, Clarence A. Black, William R. Linn, Griffin, La Salle, Joliet, and Wawatam.

Barges: Bryn Mawr and Carrington.

Total, 11 steamers and 2 barges; annual ore-carrying capacity, based on an average of 19 trips each season, 1,276,800 tons.

STEAMSHIPS FORMERLY OPERATED BY THE NATIONAL STEEL COMPANY.

Steamships: Saxon, Grecian, Roman, German, Briton, Coralia, Corsica, Corona, and Cambria.

Total, 9; annual ore-carrying capacity, based on an average of 19 trips each season, 564,300 tons.

STEAMSHIPS ACQUIRED BY THE UNION STEEL COMPANY.

Steamships: Murphy and Shaw.

Total, 2; annual ore-carrying capacity, based on an average of 19 trips each season, 228,000 tons.

SUMMARY OF VESSELS NOW OPERATED BY THE PITTSBURGH STEAMSHIP COMPANY.

The Pittsburgh Steamship Company now owns or operates 112 vessels, of which 70 are steamships and whalebacks and 42 are barges. Based on an average of 19 trips each season these vessels have an annual ore-carrying capacity of 9,716,600 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 enumerated above, excluding the two steamships acquired by the Union Steel 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, 1903, 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.

RAILROADS AND ROLLING STOCK CONTROLLED BY THE U. S. STEEL CORPORATION.

On December 31, 1903, the subsidiary companies of the United States Steel Corporation owned or operated 780.83 miles of main line of standard gauge railroads, 276.94 miles of branches and spurs, 152.09 miles of second tracks, 505.67 miles of sidings, and 179.02 miles of trackage rights, making a total of 1,894.55 miles. They also owned or operated 548 locomotives, 93 passenger and mail cars, and 28,306 ore, coal, coke, and other freight cars.

REPUBLIC IRON AND STEEL COMPANY.

Republic Iron and Steel Company; general offices, First National Bank Building, Chicago. *Officers:* Alexis W. Thompson, President; G. Watson French, Chairman Executive Committee; John F. Taylor, W. H. Hassinger, Archibald W. Houston, and George A. Baird, Vice-Presidents; John F. Taylor, Treasurer; H. L. Rownd, Secretary and General Auditor; George A. Baird, General Sales Agent; R. P. Zint, Assistant General Sales Agent; and H. R. Moore, Traffic Manager. *Operating Offices:* Chicago, W. L. Simonton, Manager Rolling Mills; Birmingham, Alabama, W. H. Hassinger, Vice-President, and R. S. McKnight, District Treasurer; Youngstown, Ohio, Charles Hart, General Manager; and Negaunee, Michigan, Alexander Maitland, General Manager.

Sales Offices: Chicago, Cincinnati, Pittsburgh, Buffalo, Cleveland, New York, St. Louis, Birmingham, and St. Paul.

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 company operates or controls the following works:

BLAST FURNACES—7.

Atlantic Furnace, (operated by the Atlantic Iron and Steel Company,) New Castle, Pa. One stack, 75 x 16⅔; originally established in 1868; recently remodeled and rebuilt; four Whitwell stoves, each 65 x 18, added in 1889; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 105,000 tons.—*Active in 1903.*

Hall Furnace, Sharon, Pa. One stack, 60 x 14; established in 1845; since rebuilt; five iron pipe stoves; fuel, coke; ore, Lake Superior; product, Bessemer, mill, and foundry pig iron; annual capacity, 50,000 tons.—*Active in 1903.*

Hannah Furnace, Youngstown, Ohio. One stack, 75 x 16; established in 1880; first put in blast June 14, 1880; since rebuilt and recently remodeled; two Cowper-Kennedy and three Massicks & Crooke stoves; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 105,000 tons.—*Active in 1903.*

Haselton Furnace, Youngstown, Ohio. Furnace at Haselton, a suburb of Youngstown. One stack, 76 x 16⅓; established in 1867; since rebuilt and recently remodeled; four Cowper-Kennedy stoves; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 105,000 tons.—*Active in 1903.*

Pioneer Furnaces, (operated by the Pioneer Mining and Manufacturing Company,) Thomas, Jefferson county, Alabama. Office, Bir-

mingham, Alabama. Three stacks, each 90 x 18½: No. 1 built in 1886–8; blown in May 15, 1888; rebuilt and remodeled in 1903; No. 2 built in 1889–90 and blown in February 22, 1890; rebuilt and remodeled in 1903; No. 3 built in 1901–2 and blown in June 13, 1902; eight Whitwell and six 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." Frank Keiser, Superintendent. Sales made through the sales offices of the Republic Iron and Steel Company at Chicago, Birmingham, St. Louis, St. Paul, Pittsburgh, Cincinnati, Cleveland, Buffalo, and New York.—*Active in 1903.*

Total annual capacity of the 7 furnaces: 635,000 gross tons.

ROLLING MILLS AND STEEL WORKS—22 ACTIVE AND 4 IDLE.

Alabama Works, Gate City, Jefferson county, 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 to 2½ inches, and light channels; annual capacity, 24,000 tons. Fuel, coal in puddling furnaces and producer gas in heating furnaces.

Alexandria Works, Alexandria, Indiana. Established in 1893–5; put in operation in July, 1895; since remodeled; 9 single and 7 double puddling furnaces, 3 regenerative gas heating furnaces, and 2 trains of rolls (20-inch muck and 21-inch bar); product, muck and bar iron; annual capacity, 40,000 tons. Fuel, natural gas.

Andrews Works, Youngstown, Ohio. Established at Niles, Trumbull county, in 1872 and removed to Haselton, a suburb of Youngstown, in 1880–1; 19 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, one 16, and one 22-inch); product, iron and steel skelp, bars, and bands; annual capacity, 45,000 tons. Fuel, coal and producer gas.

Atlantic Works, (operated by the Atlantic Iron and Steel Company,) New Castle, Pa. Established in 1838; 3 double and 25 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls (8, 16, 2-high 18, and 3-high 18-inch); product, merchant bar iron and skelp iron; annual capacity, 18,000 tons. Fuel, coal.

Birmingham Rolling Mills, (operated by the Birmingham Rolling Mill Company,) 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, 10 trains of 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, all hot; and one cold sheet train,) and 2 spike machines. Open-hearth steel department, containing 2 Siemens 30-gross-ton basic furnaces, built in 1897; first steel made July 22, 1897; annual capacity, 35,000 tons of ingots. 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 and 2,400 tons of spikes. Fuel, coal and producer gas.

Brown Bonnell Works, Youngstown, Ohio. Established in 1846; recently rebuilt and enlarged; one single and 26 double puddling furnaces, 8 gas and 6 coal heating furnaces, 12 trains of rolls, (two 20-inch puddle, one 7, one 8, and one 10-inch continuous, one 8, one 10, and one 12-inch guide, one 8-inch hoop, one 18 and one 20-inch bar, and one 20-inch universal,) 5 spike machines, and 2 washer machines; product, engine staybolt iron, channels, angles, universal plates, bar iron and steel from $\frac{1}{4}$ to $5\frac{1}{16}$ of an inch round, $\frac{1}{4}$-inch square to $4\frac{1}{2}$ inches, flats up to 20 inches, etc.; annual capacity, 250,000 tons of rolled material, 8,000 of spikes, and 400 of washers. Fuel, producer gas and coal.

Bessemer Plant, Youngstown, Ohio. 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; present plant contains two 10-gross-ton Bessemer converters with 5 cupolas, 4 soaking pits, one 40-inch blooming mill, one 26-inch continuous mill for 3 and 4-inch billets, one 18-inch continuous mill for $1\frac{1}{2}$-inch, $1\frac{3}{4}$-inch, and 2-inch billets, and one 26-inch slabbing mill; product, ingots, billets, and slabs; annual capacity, 500,000 tons of ingots and 450,000 tons of billets and slabs. Fuel, coke, producer gas, and coal. (Described in the 1901 edition of the Directory as part of the Brown Bonnell Works.)

Central Works, Brazil, Clay county, Indiana. Established in 1882–3; first put in operation January 12, 1883; 9 double puddling furnaces, one gas and 9 coal heating furnaces, 6 trains of rolls, (one 8, two 10, one 16, and two 20-inch,) and one 1,500-lb. and two 4-ton hammers; product, bar iron and Williams's wrought-iron open hexagonal turnbuckles; annual capacity, 12,000 tons of rolled iron and 300,000 turnbuckles. Fuel, producer gas.

Corns Works, Massillon, Stark county, 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.

Eagle Works, Ironton, Lawrence county, Ohio. Established in 1852; since enlarged several times; 14 single and 2 double puddling furnaces, 3 gas furnaces for bar and guide mills, one scrap furnace, and 3 trains of rolls (one 18-inch muck, one 3-high 16-inch bar, and one 9-inch guide); product, bars and light rails; annual capacity, 30,000 tons. Fuel, producer gas.

Indiana Works, Muncie, Delaware county, Indiana. Established in 1892; first put in operation in July, 1892; since enlarged; one double and 14 single puddling furnaces, 6 scrap furnaces, one regenerative scrapping furnace, 5 regenerative heating furnaces, and 4 trains of rolls (one 3-high 20-inch muck, and one 8, one 10, and one 16-inch finishing); product, iron and steel bars, bolts, nuts, washers, bridge rods, and gimlet-pointed coach screws; annual capacity, 60,000 tons of finished products. Fuel, natural gas.

Inland Works, East Chicago, Lake county, Indiana. Established in 1889; first put in operation September 15, 1889; recently rebuilt and enlarged; 13 double and 8 single puddling furnaces, 8 heating furnaces, and 6 trains of rolls (one 18 and one 22-inch muck, one 8 and one 9-inch Belgian, and one 10 and one 18-inch finishing); product, bar iron and steel; annual capacity, 84,000 tons. Fuel, coal.

Mahoning Valley Works, Youngstown, Ohio. Established in 1871; since remodeled; 24 double and 2 single puddling furnaces, one double and one single busheling furnace, 7 coal and 5 gas heating furnaces, 55 cut-nail machines, two 20-inch muck trains, and 7 trains of finishing rolls (one 7, one 9, one 12, one 16, two 18, and one 24-inch); product, merchant bar iron, angle, tank, and plate iron, etc.; annual capacity, 110,000 tons of rolled material and 120,000 kegs of cut nails. A plant for the manufacture of "Acme" polished shafting is connected with the works. Fuel, producer gas and coal.

Marion Works, Marion, Grant county, Indiana.—*Not in operation.*

Minnesota Iron Works, Columbia Heights, Anoka county, Minnesota.—*Not in operation.*

Mitchell-Tranter Works, Covington, Kenton county, Kentucky. Established in 1873; 10 puddling, 3 scrap, and 5 heating furnaces, two 5-ton steam hammers, and 5 trains of rolls (one 18-inch muck, one 8 and one 10-inch guide, one 20-inch bar, and one 26-inch plate); product, plate, channel, angle, and merchant iron, and boiler plate and plow steel; annual capacity, single turn, 15,500 tons. Fuel, coal. Brand, "Crown" horseshoe bar and refined iron. (One 7-gross-ton acid open-hearth steel furnace, built in 1879, has been dismantled.)

Muncie Works, Muncie, Delaware county, Indiana. Established in 1893; first put in operation in April, 1894; 6 single puddling

furnaces, 2 heating furnaces, and 3 trains of rolls (one 20-inch muck, one 12-inch breaking down, and one 10-inch finishing); product, band and bar iron; annual capacity, 24,000 tons. Fuel, natural gas.

Sharon Works, Sharon, Pa. Established in 1850; 8 single and 13 double puddling furnaces, 12 heating furnaces, and 5 trains of rolls (one 8-inch guide, one 12, one 16, and one 18-inch bar, and one 24-inch plate); product, bar, band, hoop, and tank iron, and light T rails; annual capacity, 30,000 tons. Fuel, coal and producer gas.

Springfield Works, Springfield, Sangamon county, Illinois. Established in 1872 and first put in operation in that year; recently rebuilt and remodeled; 11 double puddling furnaces, 5 single scrap furnaces, 7 Siemens heating furnaces, and 4 trains of rolls (one 21-inch muck, one 9-inch Belgian, and one 16 and one 22-inch bar); product, bar iron; annual capacity, 65,000 tons. Fuel, producer gas.

Sylvan Works, Moline, Rock Island county, 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.

Terre Haute Works, Terre Haute, Vigo county, Indiana. Established in 1868; since rebuilt; 5 double and 16 single puddling furnaces, 2 regenerative gas heating furnaces, and 3 trains of rolls (one 19-inch muck, one 18-inch bar, and one 10-inch guide); product, bars, bands, and horseshoe and refined iron; annual capacity, 28,000 tons. Fuel, coal and producer gas.

Toledo Works, East Toledo, Lucas county, Ohio. Established in 1883–4; since rebuilt and remodeled; 6 double puddling furnaces, 5 heating furnaces, 3 scrap furnaces, 3 trains of rolls, (one 8, one 10, and one 18-inch,) and one 5-ton hammer; product, iron and steel merchant bar and band iron; annual capacity, 36,000 tons. Fuel, coal.

Tudor Works, East St. Louis, St. Clair county, 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, bolts and nuts, and spikes; annual capacity, 62,000 tons of finished rolled material and 12,600 tons of spikes. Fuel, coal and producer gas.

Wabash Works, Terre Haute, Vigo county, Indiana. Established in 1874; one double and 15 single puddling furnaces, one scrap and 3 heating furnaces, and 3 trains of rolls (8-inch guide, 18-inch bar, and 20-inch muck); product, bars, bands, horseshoe bars, etc.; annual capacity, 22,500 tons. Fuel, coal.

Westerman Works, Marion, Grant county, Indiana.—*Not in operation.*

Wetherald Works, Frankton, Madison county, Indiana.—*Not in operation.*

Total annual capacity of the 22 active rolling mills and steel works, not including the 4 idle plants: Bessemer steel ingots, 500,000 gross tons; open-hearth steel ingots, 35,000 tons; Bessemer steel blooms and billets, 450,000 tons; cut nails, 120,000 kegs; spikes, 23,000 tons; turnbuckles, 300,000; washers, 400 tons; and finished bars, bands, rails, channels, angles, plates, etc., 1,200,000 tons.

BOLT, NUT, RIVET, WASHER, AND SPIKE WORKS.

Birmingham Rolling Mill Company, Birmingham, Alabama. Product, iron and steel spikes; sizes, standard; number of spike machines, 2; annual capacity, 2,400 tons. Two additional spike machines may be installed.

Brown Bonnell Works, Youngstown, Ohio. Product, railroad and boat spikes and washers; number of spike machines, 5; number of washer machines, 2; annual capacity, 8,000 tons of spikes and 400 tons of washers.

Indiana Works, Muncie, Indiana. Product, iron and steel bolts, nuts, washers, and rivets. Sizes: bolts, usual sizes for carriages, machinery, plows, coaches, etc.; nuts, usual sizes and all kinds; rivets, all kinds from ¼ of an inch to 2 inches.

Tudor Works, East St. Louis, Illinois. Product, iron and steel bolts, iron nuts, and iron and steel railroad and boat spikes. Sizes: bolts, ⅜ of an inch and larger; nuts, from ¼ of an inch to 2 inches; spikes, standard sizes. Annual capacity, spikes, 12,600 tons.

Total annual capacity: spikes, 23,000 tons; washers, 400 tons.

FOUNDRIES—3.

Alexandria Works, Alexandria, Madison county, Indiana. Product, gray iron castings, all consumed by the company.

Andrews Works, Youngstown, Mahoning county, Ohio. Product, gray iron castings, all consumed by the company.

Brown Bonnell Works, Youngstown, Mahoning county, Ohio. Product, gray iron castings, all consumed by the company.

COLD-DRAWN SHAFTING.

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

steel piston rods, pump rods, lead screws, fine machine rods, and line shafting; sizes, from ¼ of an inch to 6 inches round; annual capacity, from 7,500 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 Pettit, Kinney, and Franklin group of mines in the Mesabi Range. It also owns the Wills Mining Company, has a one-half interest in the Union Ore Company, and an interest in the Mahoning Ore and Steel Company, all of which operate mines in the Mesabi Range. In addition it owns a one-half interest in the Antoine Ore Company, which operates the Clifford mines in the Menominee Range. In addition it has term contracts for other ores. Through the Pioneer Mining and Manufacturing Company it owns 26,000 acres of red and brown ore and coal property in Alabama. It has a number of ore mines in operation on this property, which furnish 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 land in Washington county, Pa.

Through the Pioneer Mining and Manufacturing Company it operates in Alabama the Warner and Sayreton coal mines, extensive limestone quarries, and about 1,000 coke ovens; also the necessary railroad tracks and equipment for handling and transporting raw material from these properties to the Pioneer Furnaces, at Thomas, Alabama.

In addition the Republic Iron and Steel Company owns the Connellsville Coke Company, which owns about 2,000 acres of coking coal land in Fayette county, Pennsylvania, where it operates and is building coke ovens, and the Wilmington and Springfield Coal Company, which owns coal lands and operates coal mines in the Springfield district of Illinois.

LIMESTONE QUARRIES, ETC.

The Republic Iron and Steel Company also owns an interest in the Croton Limestone and Brick Company, which operates limestone quarries and brick plants near New Castle, Pa.; 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.

UNITED STATES SHIPBUILDING COMPANY.

United States Shipbuilding Company; general offices, 41–43 Cedar street, New York. *Officers:* James Smith, Jr., Receiver; Lewis Nixon, President; Cyrus C. Wells, Secretary; and Alfred C. Gary, Treasurer.

Capital stock, $45,000,000, of which $20,000,000 is 6 per cent. non-cumulative preferred and $25,000,000 is common. The company owns all the stock of the Bethlehem Steel Company, the Union Iron Works, the Bath Iron Works, Limited, the Hyde Windlass Company, the Harlan and Hollingsworth Company, the Eastern Shipbuilding Company, the Crescent Shipyard Company, and the Samuel L. Moore and Sons Company. It also owns and controls the buildings and property at Carteret, N. J., formerly owned by the Canda Manufacturing Company. Descriptions of the plants of the companies named above are given below:

BETHLEHEM STEEL COMPANY.

Bethlehem Steel Company; general offices, South Bethlehem, Northampton county, Pa. *Officers:* Edward M. McIlvain, President; A. E. Borie, Vice-President; H. S. Snyder, Secretary and Treasurer; Archibald Johnston, General Superintendent; and William M. Tobias, Purchasing Agent.

Selling Agents: W. L. Wright, 100 Broadway, New York; W. B. Kennedy, 421 Chestnut st., Philadelphia; C. L. Hastings, Keystone Building, Pittsburgh; E. Nelson, 1351 Marquette Building, Chicago; S. E. Freeman, 930 North Main st., St. Louis; J. P. Larkin, 430 Endicott Building, St. Paul, Minnesota; and the Abner Doble Company, San Francisco, California.

Capital stock, $15,000,000, all common. The Bethlehem Steel Company operates the following works:

BLAST FURNACES—4.

Bethlehem Furnaces, South Bethlehem, Northampton county, Pa. Four stacks: No. 2, 70 x 16, built and blown in in 1867 and rebuilt in 1877; No. 4, 70 x 15, built in 1874–5 and blown in in 1876; No. 5, 70 x 16, built in 1874–5 and blown in in 1877; No. 6, 70 x 16, built in 1881 and blown in in 1883; twelve Siemens-Cowper-Cochrane stoves; fuel, anthracite coal and Connellsville coke; product, Bessemer, basic, low-phosphorus, and foundry pig

iron made from local and foreign hematite and magnetic ores; total annual capacity, 200,000 tons. Equipped with one Davies pig-iron casting machine. Foundations for Furnace No. 8 laid in 1892; work suspended.—*Active in 1903.*

Total annual capacity of the 4 furnaces: 200,000 gross tons.

ROLLING MILLS.

Bethlehem Steel Works, South Bethlehem, Northampton county, Pa. Established in 1860. Iron mills started in 1863; Bessemer steel works added in 1873; 7 double puddling furnaces, 17 heating furnaces, (4 ordinary reverberatory and 13 bituminous coal and fuel oil,) 6 trains of rolls, (12, 22, 25, 28, 32, and 48-inch,) 4 hammers, ranging from 1,500 pounds to 10 tons each, 2 iron cupolas, and 2 spiegel cupolas; product, steel billets, beams, tees, and angles, puddled iron bars, merchant iron and steel, nickel steel bars and brake beams, axle, spring, screw, and wire steel, etc., and castings; annual capacity, 100,000 tons of merchant forms. This department also contains a general machine shop and an iron foundry. Fuel, bituminous coal, oil, and manufactured gas. (Four 7½-gross-ton Bessemer steel converters dismantled in 1902. First Bessemer blow made in October, 1873. Formerly called the Bethlehem Rolling Mills and Steel Works.)

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 steel melted August 11, 1888; an ingot weighing 104 tons has been cast; annual capacity of ingots, 100,000 tons of acid and 90,000 tons of basic. Fuel, manufactured gas.

Forge and Armor Plate Department. Connected with the 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 2,000, one 5,000, and one 14,000-tons' pressure,) 17 hammers for making small forgings, ranging from 1,100 pounds to 6 tons, and 2 bending presses (one 9,000-ton for heavy armor and one 1,000-ton for light armor); also 3 oil-tempering and annealing plants (two 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 3 hammers and 2 furnaces, is also connected with this department; also 3 machine shops (2 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, and forged armor plates, including conning towers, shields, etc.; also all grades of steel billets. 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, 8,000 tons. Fuel, manufactured gas. (One 125-gross-ton hammer dismantled in 1902.)

Total annual capacity of the rolling mills and open-hearth steel and forge and armor plate departments: open-hearth steel ingots, 190,000 gross tons; rolled products, 100,000 tons; finished armor plates, 8,000 tons; heavy steel shafting, steel forgings, and iron and steel castings are also largely produced.

IRON, BRASS, AND STEEL FOUNDRIES.

The company operates at South Bethlehem, Pennsylvania, three gray iron foundries, one brass foundry, and one steel foundry; annual capacity, 25,000 tons of iron castings, 8,000 tons of open-hearth and crucible steel castings, and 150 tons of brass castings.

STEEL CARBUILDING WORKS.

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 9 small locomotives and 1,505 cars. Its main office is at 421 Chestnut st., Philadelphia, and it has branch offices at Santiago, Cuba, and at South Bethlehem, Pa. *Officers:* Edward M. McIlvain, President; Adolphe E. Borie, Vice-President; H. S. Snyder, Secretary and Treasurer; and Thomas Redington, General Superintendent. Capital stock, $600,000, all common.

The Bethlehem Steel Company also operates the Troxell limestone quarry, on the Catasauqua and Fogelsville Railroad, near Catasauqua, Pa., and limestone quarries located at McAfee, New Jer-

sey, and Redington, Pa. Its limestone holdings amount to 187 acres and its quarries have a total annual capacity of 120,000 tons.

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

UNION IRON WORKS.

Union Iron Works; general offices, 222 Market st.; San Francisco, California; branch offices: 185 Stewart Building, New York; San Juan de Letran, No. 1, Mexico City, Mexico; and Moorgate Court, Moorgate Place, London, E. C., England. *Officers:* Henry T. Scott, Chairman of Board of Directors; W. G. Dodd, President; Frank Jeffrey, Vice-President; Charles N. Champion, Secretary and Treasurer; G. W. Dickie, Manager; and L. J. Hart, Assistant Secretary and Auditor.

Capital stock authorized, $2,000,000; issued, $1,306,000, all common. The Union Iron Works operate the following plants:

STEEL CASTING AND FORGING WORKS AND SHIP YARDS.

Union Iron Works, San Francisco, California. 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, California. Works at Potrero. Product, iron and steel forgings for their own use in mining and shipbuilding. Also build engines, boilers, etc.

Union Shipbuilding Yards, San Francisco, California. Yards at Potrero. Product, battle-ships, 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.

BATH IRON WORKS, LIMITED.

Bath Iron Works, Limited; general offices, Bath, Maine. *Officers:* E. W. Hyde, President; John S. Hyde, Vice-President and General Manager; and H. H. McCarty, Secretary and Treasurer. Capital stock, $100,000, all common.

Product, iron, steel, and composite naval vessels, passenger steamers, yachts, etc.; also light iron and steel forgings for ship repair work; also engines, boilers, tanks, etc.

HYDE WINDLASS COMPANY.

Hyde Windlass Company; general offices, Bath, Maine; branch

offices, Maritime Building, New York. *Officers:* J. R. Andrews, President and General Manager; John S. Hyde, Vice-President; and Charles F. Magoun, Secretary and Treasurer. Capital stock, $100,000, all common. Product, steam and hand windlasses, hoisting engines, steerers, steam and power capstans, etc.

HARLAN AND HOLLINGSWORTH COMPANY.

Harlan and Hollingsworth Company; general offices, Wilmington, Delaware. *Officers:* David C. Reid, President; T. Jackson Shaw, Vice-President; Henderson Weir, Secretary; S. K. Smith, Treasurer; and John Lockhart, General Manager. *Foreign Selling Agent:* Edward Mahoney, Moorgate Court, Moorgate Place, London, E. C., England. Capital stock, $1,000,000, all common.

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 COMPANY.

Eastern Shipbuilding Company; general offices, New London, Connecticut. Yards at Groton. *Officers:* Charles R. Hanscom, President and General Manager; F. W. Allen, Secretary; and Frank M. Swift, Assistant Treasurer. Capital stock, $500,000 authorized; $50,000 paid, all common. Product, all kinds of vessels.

THE CRESCENT SHIPYARD COMPANY.

The Crescent Shipyard Company; general offices, Elizabethport, Union county, New Jersey. *Officers:* Mason S. Chace, President; Horace T. Rowley, Vice-President; J. H. Blanchard, Secretary; and H. N. Worts, Treasurer. Capital stock, $1,200,000, all common. Product, all kinds of vessels.

SAMUEL L. MOORE AND SONS COMPANY.

Samuel L. Moore and Sons Company; general offices, Elizabethport, New Jersey. *Officers:* Mason S. Chace, President; Horace T. Rowley, Vice-President; J. H. Blanchard, Secretary; and H. N. Worts, Treasurer.

Authorized capital stock, $500,000; issued, $300,000, all common. Engineers, machinists, and founders.

AMERICAN STEEL FOUNDRIES.

American Steel Foundries; general offices, 74 Broadway, (Arthur Building,) New York City. *Officers:* Charles Miller, President; Daniel Eagan, First Vice-President; George B. Leighton, Second Vice-President; F. E. Patterson, Secretary and Treasurer; and Max Pam, General Counsel.

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, $15,500,000 of preferred and $15,500,000 of common. The company owns and operates the following works:

STEEL-CASTING PLANTS—7 COMPLETED AND 1 BUILDING.

Alliance Works, Alliance, Stark county, Ohio. Built in 1883 and since enlarged; five 20-gross-ton basic open-hearth steel furnaces; product, open-hearth steel castings; annual capacity, 60,000 tons. Fuel, producer gas. (Formerly operated by the American Steel Casting Company.)

East St. Louis Works, East St. Louis, St. Clair county, 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, 40,000 tons. Fuel, oil. (Formerly operated by the Shickle, Harrison, and Howard Iron Company; later by the Leighton and Howard Steel Company.)

Franklin Works, Franklin, Venango county, Pa. Built in 1895; two 15-gross-ton Siemens acid open-hearth steel furnaces; first steel made in December, 1895; product, steel castings up to 60,000 pounds; specialties, M. C. B. automatic couplers and draft boxes; also metal of high permeability for electrical purposes; annual capacity, 12,000 tons. Fuel, natural and producer gas. (Formerly operated by the Franklin Steel Casting Company.)

Granite City Works, Granite City, Madison county, Illinois. Five 20-gross-ton modified Siemens basic open-hearth steel furnaces, built in 1894 and 1898; first steel made in November, 1894; product, railway and other large castings; annual capacity, 50,000 tons. Fuel, oil. A plant for building steel freight cars is connected with the works; annual capacity, 3,000 cars. (Formerly operated by the American Steel Foundry Company.)

Indiana Harbor Works, Indiana Harbor, Lake county, Indiana. Ground broken in September, 1903; building two 20-gross-ton Siemens open-hearth steel furnaces (one acid and one basic);

will probably make acid steel in the summer of 1904 and basic steel later in the year; machinery, etc., of abandoned works at Fifty-ninth and Wallace sts., Chicago, used in equipping plant; product, locomotive, car, and other steel castings; estimated annual capacity, 15,000 tons of acid and 15,000 tons of basic castings. Fuel, oil. A steel car-wheel works will be connected with the plant.—*Will be ready for operation in 1904.*

Pittsburgh Works, corner Thirty-sixth st. and A. V. Ry., Pittsburgh, Pa. 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 pounds; specialty, small castings; annual capacity, 7,500 tons. Fuel, natural gas. (Formerly operated by the Reliance Steel Casting Company, Limited.)

Sharon Works, Sharon, Pa. Built in 1887 and first steel made August 26, 1887; one 20 and two 25-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings of all kinds; annual capacity, 45,000 tons. Fuel, producer gas. (Formerly operated by the American Steel Casting Company.)

Thurlow Works, Thurlow, (post-office address, Chester,) Delaware county, 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, 36,000 tons. Fuel, producer gas. (Formerly operated by the American Steel Casting Company.)

Total annual capacity of the 7 completed plants, 250,500 tons of steel castings; of the building plant, 30,000 tons: total, 280,500 tons.

STEEL CARBUILDING WORKS.

Granite City Works, Granite City, Madison county, Illinois. Product, steel hopper bottom, ore, coal, dump bottom, gondola, and other freight cars; annual capacity, 3,000 cars. (Formerly operated by the American Steel Foundry Company.)

STEEL CAR AND LOCOMOTIVE DRIVING WHEEL WORKS.

East St. Louis Works, East St. Louis, Illinois. Product, Davis counterbalancing locomotive driving wheels; annual capacity, 20,000 wheels. (Formerly operated by the Shickle, Harrison, and Howard Iron Company; later by the Leighton and Howard Steel Company.)

Indiana Harbor Works, Indiana Harbor, Indiana. Building works to be equipped for the manufacture of steel car wheels; estimated annual capacity, 10,000 wheels. Will also make couplers, knuckles, etc.—*Will be ready for operation in 1904.*

Total annual capacity of the 2 works: 30,000 wheels.

BARNUM RICHARDSON COMPANY.

Barnum Richardson Company; general offices, Lime Rock, Litchfield county, Connecticut; branch offices, East Canaan, Connecticut. 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, Litchfield county, Connecticut. 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.—*Active in 1903.*

Lime Rock Furnace, Lime Rock, Litchfield county, Connecticut. Established in 1734; first incorporated in 1828; incorporated by the Lime Rock Iron Company in 1863; 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 1903.*

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

IRON-ORE MINES.

The company owns and operates the Old Hill iron-ore mine at Ore Hill, Salisbury, Connecticut. In addition it operates the Davis mine, also at Salisbury, Connecticut. 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 land in Columbia county, New York, on which are located the Weed mine and the Reynolds mine.

LIMESTONE QUARRIES.

The company owns about 50 acres of limestone land at East Canaan and at Lime Rock, Connecticut, on which quarries with an annual capacity of about 4,000 tons are located.

THE BURDEN IRON COMPANY.

The Burden Iron Company; general offices, Troy, Rensselaer county, New York. *Officers:* James A. Burden, President; James A. Burden, Jr., Vice-President; Nicholas J. Gable, Secretary; and John L. Arts, General Manager. The company operates the following plants:

BLAST FURNACES—1.

Burden Iron Works, Troy, New York. One stack, 60 x 14½, built in 1865; three Gordon-Whitwell stoves; fuel, anthracite coal and coke; ores, magnetic from Northern New York, hematite and carbonate from Eastern New York, and Lake Superior; product, forge pig iron; annual capacity, 50,000 tons. (One stack, built in 1867, abandoned in 1903.)—*Active in 1903.*

Annual capacity: 50,000 gross tons of forge pig iron.

ROLLING MILLS—1.

Burden Iron Works, Troy, New York. 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."

Total annual capacity of the rolling mills: 45,000 gross tons.

RIVET AND HORSESHOE WORKS.

Burden Iron Works, Troy, New York. Product, iron rivets; sizes, from ½ of an inch to 1¼ inches in diameter; also horseshoes.

NATIONAL STEEL AND WIRE COMPANY.

National Steel and Wire Company; main offices, New Haven, Connecticut; branch offices, 56–8 West Van Buren st., Chicago, and De Kalb, Ill.; 100 Front st., San Francisco, Cal.; 114 Liberty st., New York; 18 Post Office Square, Boston, Mass.; and 304 Delaware st., Kansas City, Mo. *Officers:* Everett B. Webster, President; E. F. Shellaberger, Vice-President; E. R. Hastings, Treasurer; and H. Sanborn Smith, Vice-President and Secretary.

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 the securities of the follow-

ing constituent companies, which operate plants at New Haven, Conn., Bayonne, N. J., De Kalb, Ill., and Oakland, Cal.

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

De Kalb Fence Company, De Kalb, Ill. Established in 1890; product, wire fencing and "Eagle" barbed wire; also manufactures gates, posts, and fittings for each style of fence. Equipped with a foundry and machine shop for building fence machines. Annual capacity, 12,000 tons of fence. E. F. Shellaberger, President; Everett B. Webster, Vice-President; and Judson Brenner, Secretary and Treasurer.

Kansas Steel and Wire Works, Kansas City, Missouri. A distributing company for the De Kalb Fence Company and the Union Fence Company; warehouse and office only; not manufacturers.

National Steel Foundry Company, New Haven, Connecticut. 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; annual capacity, 12,000 tons. Fuel, manufactured gas. Henry L. Hotchkiss, President; Frederick B. Farnsworth, Vice-President; H. Stuart Hotchkiss, Treasurer; Eugene Buckman, Secretary; and M. Sims, Manager.

National (The) Wire Corporation, New Haven, Connecticut. 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; works entirely destroyed by fire on February 3, 1901; rebuilt with much larger capacity in 1901–2; rod mill started in August, 1902, and wire mill started on January 5, 1903. Present rod mill contains 2 double continuous heating furnaces, (arranged for the use of gas or petroleum,) 4 gas producers, 5 trains of rolls, etc. Galvanizing department contains two 24-block galvanizing frames, with tile annealing furnaces, designed for telegraph and telephone wire. Product: wire rods—sizes, from No. 5 to $\frac{9}{16}$ of an inch; wire of all kinds—bright, annealed, coppered and liquor drawn, and tinned and galvanized, from $\frac{1}{2}$ of an inch to No. 36 gauge; also all sizes of wire nails, barbed wire, field, lawn, and poultry fence, wire strand and wire rope, plain and galvanized wire, and other wire specialties; annual capacity, 90,000 tons of wire rods, 40,000 tons of wire, 100,000 kegs of wire nails, and 10,000 tons of wire fencing, wire rope, and other specialties. Fuel, anthracite and bituminous coal and oil. E. R. Hastings, President; H. Sanborn Smith, Vice-President; Everett B. Webster, Treasurer; and W. H. Seaver, Secretary.

Pacific Steel and Wire Company, 100 Front st., San Francisco, California. Works at Oakland. Product, field, poultry, and farm fencing, 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, New Jersey. Product, complete lines of rubber insulated wires and submarine cables. B. M. Whitlock, President and General Manager; Ira W. Henry, Vice-President; Le Roy Clark, Vice-President and Treasurer; and H. Sanborn Smith, Secretary.

Union Fence Company, De Kalb, Ill. This company is associated with the De Kalb Fence Company, but is an entirely separate organization. It manufactures field, lawn, and poultry fencing.

Total annual capacity of the plants described above: 90,000 gross tons of wire rods, 12,000 tons of steel castings, 40,000 tons of wire, 100,000 kegs of wire nails, and about 38,000 tons of wire fencing, wire rope, and other wire specialties.

LACKAWANNA STEEL COMPANY.

Lackawanna Steel Company; West Seneca, Erie county, New York, (post-office address, Buffalo; railroad address, Lackawanna.) New York office, 100 Broadway. *Officers at New York:* ——— ——— President; Walter Scranton, Chairman of Board of Directors; Moses Taylor, Vice-President; James P. Higginson, Treasurer; John W. Farquhar, Secretary; Frederick F. Graham, Assistant Treasurer and Assistant Secretary; Charles D. Rhodes, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo:* George L. Reis, Vice-President and General Manager; Marshall Lapham, Comptroller; S. B. Sheldon, General Superintendent; and John N. Allen, General Purchasing Agent.

Selling Agents: Gerald Lomer, Canadian Agent, Fraser Building, Montreal; F. A. Barbey, New England Agent, 185 Summer st., Boston; George W. Smith, District Sales Agent, 322 North Charles st., Baltimore; W. G. Henderson, District Sales Agent, 301 Citizens Building, Cleveland; Julian L. Yale, General Western Sales Agent, Railway Exchange Building, Chicago; and Charles W. Pike & Co., Pacific Coast Sales Agents, 124 California st., San Francisco.

Capital stock authorized, $60,000,000; issued, $35,000,000. First mortgage 5 per cent. convertible gold bonds authorized, $20,-

000,000; issued, $15,000,000. The Lackawanna Steel Company operates or controls the following works:

BLAST FURNACES—3 COMPLETED AND 3 BUILDING.

Lackawanna Furnaces, Lackawanna, Erie county, New York. Three completed stacks and three stacks building.

Completed stacks, Nos. 1 and 2, each 87 x 17, built in 1901-2; each furnace has four central combustion chamber stoves, each 18 x 85; No. 3, 94 x 24, built in 1902-4; four central combustion stoves, each 22 x 121 feet; No. 1 first blown in February 11 and No. 2 May 2, 1903; No. 3 to be blown in in May, 1904; fuel, Wallston and Mount Pleasant coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 415,000 tons. Brand, "Lackawanna." Gas from the blast furnaces will be largely used for power purposes.—*Nos. 1 and 2 active in 1903; No. 3 not blown in down to May 1, 1904.*

Building stacks, Nos. 4, 5, and 6, will each be 94 x 24 feet; coke will be used for fuel and each furnace will have an annual capacity of about 240,000 tons of Bessemer pig iron; each stack will be equipped with four central combustion chamber stoves, each 22 x 121 feet.—*Furnace No. 4 will be ready for blast in July and No. 5 in October, 1904, and No. 6 in January, 1905.*

Total annual capacity of the 3 completed furnaces, 415,000 tons; of the 3 building furnaces, 720,000 tons: total, 1,135,000 tons.

COMPLETED ROLLING MILLS AND STEEL WORKS.

Lackawanna Steel Works, Lackawanna, New York. Bessemer steel works 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; annual capacity, 845,000 tons.

Rail Mill No. 1; built in 1902-3; six 16-hole heating pits and 5 stands of 32-inch rolls; first steel rail rolled October 20, 1903; product, steel rails; annual capacity, 600,000 tons. Brand, "Lackawanna." Fuel, bituminous coal, coke, and producer gas.

BUILDING ROLLING MILLS AND STEEL WORKS.

Rail Mill No. 2; commenced building in 1902; will probably be ready for operation in June, 1904; to contain 5 continuous gas heating furnaces and 5 stands of 24-inch rolls; product, to be structural shapes, splice bars, merchant bar steel, and light rails; estimated annual capacity, 80,000 tons of structural shapes and merchant bars, 40,000 tons of splice bars, and 70,000 tons of 12 to 65-pound rails. Brand, "Lackawanna." Fuel, bituminous coal and producer gas.

Open Hearth Steel Department; commenced building in 1903; six

60-gross-ton Siemens basic open-hearth steel furnaces; first basic open-hearth steel will probably be made in June, 1904; estimated annual capacity, 250,000 tons of ingots and direct castings. Fuel, producer gas.

Universal Mill; commenced building in 1903; one 48-inch universal mill, to be equipped with 6 Siemens heating furnaces; product, to be universal plates up to 48 inches wide and shear plates up to 80 inches wide; estimated annual capacity, 180,000 tons.

Slabbing Mill; commenced building in 1903; one 32-inch slabbing mill, to be equipped with four 4-hole soaking pits; product, to be slabs, blooms, and billets; estimated annual capacity, 240,000 tons.

Merchant Mill; commenced building in 1903; one 16 and 12-inch combination merchant mill, to be equipped with 2 continuous heating furnaces; product, to be all sizes and shapes for car, agricultural implement, and bolt manufacturers; estimated annual capacity, 75,000 tons.

Total annual capacity of the completed rolling mills and steel works: 845,000 gross tons of Bessemer steel ingots and 600,000 tons of standard sizes of steel rails; of the building rolling mills and steel works: 250,000 tons of open-hearth steel ingots and castings, 80,000 tons of structural shapes and merchant bars, 40,000 tons of splice bars, 70,000 tons of light rails, 240,000 tons of slabs, blooms, and billets, 180,000 tons of universal and shear plates, and 75,000 tons of merchant bars.

Grand total of completed and building rolling mills and steel works: 1,095,000 gross tons of steel ingots and castings, 240,000 tons of slabs, blooms, and billets, 670,000 tons of standard and light rails, and 375,000 tons of other finished rolled products.

IRON AND BRASS FOUNDRIES.

The company owns a foundry at Lackawanna and leases another foundry at Buffalo, the latter owned by the Lake Erie Engineering Company. Brass and iron castings are made at Lackawanna; annual capacity, 7,800 tons of iron and 100 tons of brass castings. At Buffalo iron castings only are made; annual capacity, 7,600 tons.

RAILROADS, COKE OVENS, AND IRON-ORE PROPERTIES.

The Lackawanna Steel Company owns the South Buffalo Railway Company, which operates 19 miles of track, 22 locomotives, 22 passenger cars, and 187 freight and other cars.

The company is building 940 by-product coke ovens at Lackawanna, N. Y. It controls 237 completed by-product ovens owned by the Lackawanna Iron and Steel Company at Lebanon, Pennsylvania. When the building ovens are completed the company will have a total annual capacity of 1,198,000 tons of coke.

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,) contracts for the purchase of mined ore, and by shareholdings in the following companies: Witherbee, Sherman & Co., of New York; the Odanah Iron Company, of Wisconsin; the Verona Mining Company, of Michigan; the Scranton Mining Company, the Hobart Iron Company, and the Corsica Iron Company, all of Minnesota; and the Ontario Mining Company, of West Virginia; also in the Tilly Foster iron mines in New York.

LACKAWANNA IRON AND STEEL COMPANY.

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

Lackawanna Iron and Steel Company, Lebanon, Pa.; also West Seneca, New York, (post-office address, Buffalo,) and 100 Broadway, New York. *Officers at New York:* ——— ———, President; Moses Taylor, Vice-President; James P. Higginson, Treasurer; John W. Farquhar, Secretary; Frederick F. Graham, Assistant Treasurer and Assistant Secretary; Charles D. Rhodes, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo:* George L. Reis, Vice-President; Marshall Lapham, Comptroller; and John N. Allen, General Purchasing Agent.

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, Lebanon county, Pa. Two stacks, each 75 x 18; No. 1, built in 1872-3, and No. 2, built in 1879; both rebuilt in 1885 and relined in 1903; Whitwell stoves; fuel, coke; ore, Cornwall; product, principally Bessemer pig iron; total annual capacity, 80,000 tons. Brand, "Lackawanna." (Owned by the Cornwall Iron Company.)—*No. 1 active in 1903; No. 2 idle the entire year.*

Colebrook Furnaces, (owned,) Lebanon, Lebanon county, Pa. Two stacks: No. 1, 81¼ x 18, built in 1881, remodeled in 1887, rebuilt in 1895, and relined in 1903; No. 2, 85 x 18, completed in November, 1882, and relined in 1903; Lackawanna stoves; fuel, coke; ore, Cornwall; product, principally Bessemer pig iron; total annual capacity, 125,000 tons. Brand, "Lackawanna."—*No. 1 active in 1903; No. 2 idle the entire year.*

North Cornwall Furnace, (leased,) Cornwall, Lebanon county, Pa. One stack, 80 x 18, built in 1872, rebuilt in 1890, and relined in 1903; Whitwell stoves; fuel, coke; ore, Cornwall; product, principally Bessemer pig iron; annual capacity, 45,000 tons. Brand, "Lackawanna." (Owned by the Cornwall Iron Company.)—*Last active in 1902.*

Total annual capacity of the 5 furnaces: 250,000 gross tons.

DISMANTLED FURNACES, ROLLING MILLS, AND STEEL WORKS.

The Lackawanna Iron and Steel Company formerly operated four blast furnaces and two rolling mills and steel works at Scranton, Lackawanna county, Pennsylvania. The latter were equipped with Bessemer converters and steel rail trains, and were known as the North and South works. The furnaces and the rolling mills and steel works were dismantled in 1901–2.

IRON-ORE PROPERTIES AND COKE OVENS.

The Lackawanna Iron and Steel Company owns a one-sixth interest in the Cornwall ore banks, at Cornwall, Lebanon county, Pa. It also has an additional voting interest. In addition it owns and operates 237 completed by-product coke ovens at Lebanon.

LACKAWANNA COAL AND COKE COMPANY.

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

Lackawanna Coal and Coke Company, Wehrum, Indiana county, Pennsylvania; also West Seneca, Erie county, New York, (post-office address, Buffalo,) and 100 Broadway, New York City. *Officers at New York:* Walter Scranton, President; Moses Taylor and Warren Delano, Jr., Vice-Presidents; James P. Higginson, Treasurer; John W. Farquhar, Secretary; Frederick F. Graham, Assistant Treasurer and Assistant Secretary; Charles D. Rhodes, General Sales Agent; and George F. McKay, Traffic Manager. *Officers at Buffalo:* George L. Reis, Vice-President; Marshall Lapham, Comptroller; and John N. Allen, General Purchasing Agent. *Officer at Wehrum:* C. R. Claghorn, Superintendent. Capital stock, $500,000.

The Lackawanna Coal and Coke Company owns 12,642 acres of coal rights in Cambria and Indiana counties, Pennsylvania, and 10,634 acres of coal land in fee in the same counties. Its mines have an annual capacity of about 1,800,000 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, New Jersey; also West Seneca, Erie county, New York, (post-office address, Buffalo,) and 100 Broadway, New York. *Officers at New York:* Walter Scranton, President; Moses Taylor, Vice-President; James P. Higginson, Treasurer; and John W. Farquhar, Secretary. *Officer at Franklin Furnace, New Jersey:* S. P. Tomkins, Superintendent. Capital stock, $300,000.

The Franklin Iron Company owns limestone lands at Franklin Furnace, Sussex county, New Jersey, on which it has one active quarry. (Franklin Furnace, built in 1873, and formerly owned by this company and operated under lease by the Lackawanna Iron and Steel Company, has been dismantled.)

UNION IRON AND STEEL COMPANY.

Union Iron and Steel Company; general offices, 71 Broadway, New York. *Officers at New York:* E. L. Harper, Vice-President and General Manager; Thomas S. Holmes, Treasurer; and W. H. Binnian, Chairman of Executive Committee. *Officer at Boston:* William Rotch, President. *Officer at Big Stone Gap, Virginia:* E. L. Harper, Jr., Secretary. All sales made by the company.

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 operates the following works:

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

Chatham Furnace, Chatham, Columbia county, New York. One stack, 32 x 9, built in 1873 and blown in in July, 1873; 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." (Formerly operated by the Salisbury Carbonate Iron Company.)—*Active in 1903.*

Union Furnace, Ironton, Lawrence county, 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 1903.*

Union No. 1 and Union No. 2 Furnaces, Big Stone Gap, Wise county, Virginia. One completed stack (Union No. 1) and one stack building, (Union No. 2.) Union No. 1, 75 x 18, built in 1890–2 and blown in May 4, 1892; rebuilt in 1900–1; five Whitwell stoves; fuel, Pocahontas Flat Top and Wise county (Virginia) coke; ore, local fossil; product, Bessemer, forge, and high-grade foundry pig iron; annual capacity, 50,000 tons. Brand, "Big Stone Gap." Union No. 2, to be 75 x 18, was partly built in 1892 and work suspended; work resumed in 1903; estimated annual capacity, 50,000 tons. (Union No. 1 Furnace formerly operated by the Big Stone Gap Iron Company and called Jennie and Union No. 2 formerly called Polly.)—*Active in 1903.*

Total annual capacity of the 3 completed furnaces, 100,000 tons of coke pig iron and 10,000 tons of charcoal pig iron; of the building furnace, 50,000 tons of coke pig iron: total, 160,000 tons.

ROLLING MILLS AND STEEL WORKS—2.

Jefferson Steel Works, Birmingham, Alabama. Built in 1889–90; one 15-gross-ton basic open-hearth steel furnace; first steel made April 24, 1890; product, steel ingots; annual capacity, 8,100 tons. Fuel, manufactured gas. Brand, "Jefferson." (This furnace takes the place of an experimental Henderson open-hearth steel furnace built in 1887–8 and which first made steel on February 27, 1888. Hawkins steel was experimentally produced at these works in 1897. (The works were formerly owned by the Union Steel and Chain Company.)—*Idle and for sale or lease.*

Union Rolling Mills, Denver, Denver county, Colorado. Built in 1894 and improved in 1900; 2 coal-fired heating furnaces and one 10-inch train of rolls; product, merchant bar iron, bolts, and 8, 12, and 16-lb. T rails; annual capacity, 10,000 tons. Fuel, coal. Brand, "Union." (Formerly owned by the Union Rolling Mill and Foundry Company.)

Total annual capacity of the rolling mills and steel works: open-hearth ingots, 8,100 tons; finished rolled products, 10,000 tons.

BOLT WORKS AND FOUNDRIES.

Union Rolling Mills, Denver, Colorado. Bolt department: product, iron machine bolts; annual capacity, 500 tons. Foundry department: product, gray iron and brass castings; annual capacity, 10,000 tons.

THE BUFFALO UNION FURNACE COMPANY.

The Buffalo Union Furnace Company; general offices, Buffalo, New York; branch office, Cleveland, Ohio. *Officers:* D. R. Hanna, President; F. B. Baird, Vice-President; C. A. Collins, Secretary; R. L. Ireland, Treasurer; F. B. Richards, 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 following blast furnaces:

BLAST FURNACES—1 CHARCOAL AND 2 COKE STACKS.

Furnace A, Buffalo, Erie county, New York. One stack, 80 x 18, built in 1892 and first blown in February 25, 1893; one 2-pass Kennedy and three Cowper-Kennedy stoves; fuel, Walston or Connellsville coke; ore, Lake Superior hematite; product, foundry, Bessemer, basic, and malleable pig iron; annual capacity, 80,000 tons. Brand, "Buffalo."—*Active in 1903.*

Furnace B, Buffalo, New York. One stack, 76 x 17, built in 1897–8 and first blown in August 12, 1899; four 75 x 20 Hartman stoves; fuel, Walston or Connellsville coke; ore, Lake Superior; product, foundry, Bessemer, basic, and malleable pig iron; annual capacity, 80,000 tons. Brand, "Buffalo."—*Active in 1903.*

Furnace C, Buffalo, Erie county, New York. One stack, 60 x 15, built in 1899–1900 and blown in June 18, 1901; three hot-blast stoves; fuel, charcoal; ore, Lake Superior; product, car-wheel, malleable, and low-phosphorus pig iron; annual capacity, 40,000 tons. Brand, "Buffalo Charcoal."—*Active in 1903.*

Total annual capacity of the 3 furnaces: 160,000 gross tons of coke pig iron and 40,000 tons of charcoal pig iron.

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; and H. S. Wardner, Treasurer. *Officer at Newark, N. J.:* D. A. Van Ingen, Superintendent of Furnaces. All sales made by the company.

Capital stock, $10,000,000, all common. The company operates or

controls the following blast furnaces, including the furnaces owned by the New Jersey Zinc Company (of Pa.)

BLAST FURNACES—3.

Hudson County Furnace, Newark, Essex county, N. J. Furnace in Hudson county. One stack, 40 x 10, built in 1883 and first put in blast in February, 1884; rebuilt in 1894; four 21-pipe Cooper-Durham stoves; fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; annual capacity, 10,000 tons. —*Active in 1903.*

Newark Furnaces, Newark, Essex county, 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; and 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. A zinc oxide plant and repair shops are connected with these furnaces.—*Active in 1903.*

Total annual capacity of the 3 furnaces: 28,000 tons of spiegeleisen.

THE NEW JERSEY ZINC COMPANY (OF PA.)

The New Jersey Zinc Company (of Pa.); general offices, South Bethlehem, Pa. *Officers:* S. S. Palmer, President; A. P. Cobb, Secretary; and H. S. Wardner, Treasurer. *Selling Agents:* The New Jersey Zinc Company, 71 Broadway, New York. Capital stock, $700,000, all controlled by the New Jersey Zinc Company. The company operates the following works:

BLAST FURNACES—2.

Palmerton Furnace, Palmerton, Carbon county, Pa. One stack, 60 x 14, built in 1901–3; first blown in April 5, 1904; five 32-pipe Cooper-Durham stoves; fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; estimated annual capacity, 20,000 tons. Connected with this furnace are repair shops, a foundry, and plants for the manufacture of zinc oxide, spelter, sulphuric acid, and lithopone.—*Active in 1904.*

South Bethlehem Furnace, South Bethlehem, Northampton county, 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, and plants for the manufacture of zinc oxide and spelter are connected with this furnace.—*Active in 1903.*

Total annual capacity of the 2 furnaces: 25,400 tons of spiegeleisen.

JOSEPH WHARTON.

Joseph Wharton; general offices, 421 Chestnut street, Philadelphia; branch offices, Phillipsburg, N. J., for Andover Iron Company; Wharton, N. J., for Wharton Furnaces, mines, etc.; and Coral, Indiana county, and Smithfield, Fayette county, Pa., for coal lands and coke ovens. *Selling Agents:* B. Nicoll & Co., 59 Wall st., N. Y. Mr. Wharton owns and operates the following works:

BLAST FURNACES—4.

Wharton Furnaces, Wharton, (formerly called Port Oram,) Morris county, 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, but occasionally some anthracite mixed with coke; ores, New Jersey magnetite, Rossie hematite from St. Lawrence county, New York, and occasionally some Lake Superior hematite; product, neutral foundry, forge, malleable, and basic pig iron; total annual capacity, 300,000 tons. Brand, "Wharton." Equipped with one Uehling and one Weimer pig-iron casting machine. Edward Kelly, Manager.—*Active in 1903.*

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county, 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, but occasionally some anthracite 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, 60,000 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 1903.*

Total annual capacity of the 4 furnaces: 360,000 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 Wharton and Andover Furnaces.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

Mr. Wharton owns about 3,000 acres of lands carrying iron ore near Wharton, N. J., where he operates the Wharton, Andover, and Hibernia mines, the Teabo and Allen mines, the Byram mine, the Scrub Oaks mine, and the Baker mine; he also owns and operates the Rossie iron-ore mine, near Spragueville, N. Y. These mines have an annual production of about 300,000 tons of iron ore, which may be doubled when needed. Connected with the Hibernia and Andover mines are three plants for magnetically concentrating iron ore.

Mr. Wharton also owns about 5,000 acres of coal lands in Indiana and Fayette counties, Pa. He owns and operates 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 300,000 net tons of coke. His coal lands in Indiana county supply all the coal needed for his iron mines, etc., and also mine coal for sale. He has a general store at Coral. In addition he owns several hundred dwelling houses at Wharton, Hibernia, Coral, and Rossie.

Mr. Wharton also owns the Morris County Railroad Company, the Morris County Connecting Railroad Company, and the Port Oram Railroad Company, which have about 20 miles of track, exclusive of yard tracks. These companies carry the magnetic ores from his Hibernia mines to his furnaces at Wharton: they operate 6 locomotives and sundry freight, road, and other cars. Traffic is mainly carried on cars owned by connecting railroads.

The Andover Iron Company owns 20 acres of limestone land adjoining its furnace plant at Phillipsburg, Warren county, N. J., which yield an annual production of about 50,000 tons of limestone that may be quadrupled if needed.

A trial plant for the manufacture of cement from blast furnace slag is being established at Wharton, New Jersey.

EMPIRE STEEL AND IRON COMPANY.

Empire Steel and Iron Company; general offices, Catasauqua, Lehigh county, Pa. *Officers:* Leonard Peckitt, President; Charles H. Zehnder, Vice-President; J. S. Stillman, Treasurer; and J. M. Fitzgerald, Secretary.

Selling Agents: Rogers, Brown & Co., New York, Cincinnati, Cleveland, Buffalo, 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. No bonds have been issued by the company. In December, 1903, $2,500,000 of preferred and $2,281,400 of common stock had been issued. The Empire Steel and Iron Company operates or controls the following blast furnaces and other properties:

BLAST FURNACES—10 COMPLETED AND 1 PROJECTED.

Cherokee Furnace, Greensboro, Guilford county, North Carolina. One stack, 70 x 16½, built in 1892; iron shell on cast-iron columns; first blown in April 25, 1899; two Ford & Moncur stoves; fuel, Pocahontas coke; ores, local magnetite and limonite from the company's mines; product, foundry and forge pig iron; annual capacity, 35,000 tons. Brand, "Cherokee."—*Active in 1903.*

Crane Furnaces, Crane Iron Works, Catasauqua, Lehigh county, Pa. Four stacks, two 75 x 17 (one rebuilt in 1901 and one rebuilt in 1902) and two 60 x 16, (one rebuilt in 1903.) Original furnaces were built in 1839, 1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881; one has iron stoves and three have 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, 180,000 tons. Brands, "Crane" and "Crane L. P." Leonard Peckitt, President; J. M. Fitzgerald, Secretary; James M. Hodge, Treasurer. (Operated by the Crane Iron Works.)—*Active in 1903.*

Henry Clay Furnaces, Reading, Berks county, 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 and three iron stoves; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, foundry and gray forge pig iron; total annual capacity, 40,000 tons. Brand, "Henry Clay."—*Active in 1903.*

Macungie Furnace, Macungie, Lehigh county, 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 1903.*

Oxford Furnace, Oxford, Warren county, New Jersey. One stack, 63 x 17½, built in 1871, remodeled in 1900, and repaired in 1902; two Kent and one Durham iron pipe ovens; fuel, anthracite coal; ore, magnetic mined near the furnace; product, Bessemer,

foundry, and forge pig iron; annual capacity, 36,000 tons. Brand, "Oxford." A new furnace may be built.—*Active in 1903.*

Topton Furnace, Topton, Berks county, 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, 35,000 tons. Brand, "Topton."—*Active in 1903.*

Total annual capacity of the 10 furnaces: 351,000 gross tons.

IRON-ORE AND COAL LANDS, COKE OVENS, AND RAILROAD LINES.

The company owns at Oxford, New Jersey, 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. It owns iron-ore mines at Ore Hill, near Greensboro, North Carolina, and at Wheatfield, near Reading, Pa.

The company also owns and operates the Mount Hope Mineral Railroad, $4\frac{5}{100}$ 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, New Jersey; also the Lehigh and Oxford Railroad, 3 miles long, extending from Butzville, N. J., to Queen Mines, N. J.

It also owns the controlling interest in the Alleghany Ore and Iron Company, which operates several blast furnaces and the Oriskany mines in Virginia and the coal mines and coke ovens of the Victoria Coal and Coke Company in West Virginia. [For descriptions of the properties of these companies see pages 178-80.]

HENRY DISSTON & SONS, (INCORPORATED.)

Henry Disston & Sons, (Incorporated;) general offices, Tacony, Philadelphia. Address communications to post-office box 1537, Philadelphia. Branch offices: Boston, Cincinnati, Chicago, Louisville, New Orleans, and San Francisco. *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 400,000 cross-cut saws and 80,000 circular 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, Louisville, New Orleans, and San Francisco. *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, $1,500,000, all common. Par value of stock, $100 per share. The company operates the following works:

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, one 36, and three 24-pot crucible steel-melting furnaces; first rolling mill built in 1866; 8 trains of rolls, (one 9-inch guide, one 12-inch guide, one 18-inch bar and band, two 16, one 18, and one 20-inch sheet, and one 28-inch plate,) 4 cold sheet mills, (two 8, one 10, and one 20-inch,) one gas and 26 coal heating and annealing furnaces, and 3 hammers (one 600-lb., one 1,100-lb., and one 2½-ton); one 10-gross-ton basic open-hearth steel furnace added in 1900 and first steel made October 3, 1900; product, principally saw steel of every description, engravers' plates, and sheet steel for all other purposes; annual capacity, 9,000 tons of crucible ingots, 4,000 tons of open-hearth ingots, and 7,000 tons of rolled products. 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; annual bar and band and rod-rolling capacity, 20,000 tons. The steel works were originally built in Philadelphia and were removed to Tacony in 1879, 1881, 1883, and 1884. Fuel, coal and manufactured gas. Brand, "Disston." Adding one 36-pot crucible steel-melting furnace and one 600-lb. hammer. (One 30-gross-ton steel cementing furnace abandoned.)

Total annual capacity: 9,000 gross tons of crucible ingots, 4,000 tons of open-hearth ingots, 20,000 tons of bars, bands, and rods, and 7,000 tons of other rolled products.

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, Louisville, New Orleans, and San Francisco. *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 of stock, $100 per share. The Henry Disston and Sons File Company manufactures files of all shapes, sizes, and kinds of cuts.

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, New Jersey. *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 office of the company at Easton.

Capital stock, $2,500,000, all of which is common. There is no bonded indebtedness. The company operates the following works:

BLAST FURNACES—9.

Thomas Iron Works: 9 stacks, all located in Lehigh and Northampton counties, Pennsylvania.

Hokendauqua Furnaces, Hokendauqua, Lehigh county, 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, 155,000 tons. (No. 2 furnace was abandoned in 1893 and No. 4 in 1902.)—*Active in 1903.*

Keystone Furnace, (Island Park,) Easton, Northampton county, 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, 20,000 tons.—*Active in 1903.*

Lock Ridge Furnaces, Alburtis, Lehigh county, Pa. Two stacks: No. 7, 60 x 14, built in 1867; No. 8, 60 x 16, built in 1869; No. 7 has iron pipe stoves and No. 8 has Durham pipe stoves; fuel, anthracite coal; total annual capacity, 35,000 tons.—*Active in 1903.*

Saucon Furnaces, Hellertown, Northampton county, 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, 50,000 tons.—*Active in 1903.*

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: 260,000 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 one-third of the capital stock of the Mount Hope Mineral Railroad Company, in New Jersey, and two-fifths of the capital stock of the Catasauqua and Fogelsville Railroad Company.

It also owns and operates the following limestone quarries: the Saeger quarry, on the line of the Ironton Railroad; the Ruth quarry, on the line of the Catasauqua and Fogelsville 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 line of the Ironton Railroad, the Riegel, Grim, and Wagner quarries, at Hellertown, and the Spring Creek and Ruth quarries, at Alburtis. The annual capacity of all the quarries above enumerated is about 200,000 tons of limestone.

IRON-ORE MINES.

The company also owns the Richard iron-ore mine, at Wharton, New Jersey, with an annual capacity of 100,000 tons; the Wawayanda mines, near Warwick, New York, and fourteen other iron-ore properties in Lehigh and Berks counties, Pennsylvania. The annual capacity of the iron-ore mines in Lehigh and Berks counties amounts to about 100,000 tons.

THE PHŒNIX IRON COMPANY.

The Phœnix Iron Company; general offices, 410 Walnut street, Philadelphia; branch offices, 49 William street, New York;

110 State street, Boston; and Rookery Building, Chicago. *Officers at Philadelphia:* David Reeves, President; George Gerry White, Secretary; and George C. Carson, Jr., Treasurer. *Officers at Phœnixville, Pa.:* William H. Reeves, 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 Phœnix Iron Company operates the following works:

ROLLING MILLS AND STEEL WORKS—1.

Phœnix Iron Works, Phœnixville, Chester county, Pa. Original works built in 1808; new mill built in 1873; 16 Siemens heating furnaces, one Siemens and 19 Phœnix 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 Mackintosh & Hemphill 28 x 48-inch reversing engines of the latest design; all material is put in and drawn from the furnaces by Wellman-Seaver Engineering Company's patent electric charging machine and transfer buggy; also handled at rolls by electrically driven tables designed by the Wellman-Seaver Engineering Company; product, open-hearth steel bars, beams, channels, angles, tees, miscellaneous structural shapes, and steel castings; total annual capacity, 150,000 tons. Fuel, bituminous coal.

Steel works, built in 1888–9, and enlarged in 1899, contain three 30 and three 40-gross-ton basic and one 30 and one 40-gross-ton acid open-hearth steel furnaces with an annual capacity of 150,000 tons of ingots; furnaces charged by two Wellman-Seaver Engineering Company's patent electric charging machines; also 14 Siemens and 2 Duff gas producers; also one 36-inch blooming mill, driven by a pair of Mackintosh & 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: Open-hearth steel ingots, 150,000 gross tons; open-hearth steel bars, beams, channels, other shapes, and castings, 150,000 tons.

BRIDGEBUILDING WORKS AND FOUNDRY DEPARTMENT.

Phœnix Bridge Works, Phœnixville. 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. A hydraulic testing machine, with a capacity of 2,000,000 pounds, is also connected with this department.

Phœnix Foundry, Phœnixville, Pennsylvania. Product, all kinds of

heavy iron and open-hearth steel castings; annual capacity, 6,000 tons of iron and 2,500 tons of steel castings.

BOLT, NUT, RIVET, AND STEEL FORGING WORKS.

Phœnix Bolt, Nut, and Rivet Works, Phœnixville, Pa. Product, bolts, nuts, and rivets, all consumed by the company; sizes, from ½ of an inch to 1½ inches inclusive.

Phœnix Forge Works, Phœnixville, Pa. Product, forged steel eyebars, forged steel rounds, etc.; annual capacity, 8,000 tons.

IRON-ORE LANDS AND LIMESTONE QUARRIES.

The company owns 1,330 acres of iron-ore lands in Chester, Montgomery, Berks, and Lancaster counties, Pa. It also owns 15 acres of limestone lands at Port Kennedy, Pa., where it operates limestone quarries with an annual capacity of 40,000 tons.

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, New Jersey, 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, whose works are at Steelton, Harrisburg, and Lebanon, Pennsylvania, and all the stock of the Maryland Steel Company, whose works are 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.

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 streets, Philadelphia; branch offices, Empire Building, 71 Broadway, New York City; 70 Kilby street, Boston; Continental Trust Building, Baltimore; 413 Western Union Building, Chicago; and 110 Cannon st., London, E. C., England. *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:* H. H. Campbell, General Manager; John W. Dougherty, Superintendent; and Frank D. Carney, Assistant Superintendent.

Sales Agents: W. C. Cuntz, Steelton; Richard Peters, Philadelphia; A. E. Aeby, New York; Charles S. Clark, Boston; R. C. Hoffman & Co., Continental Trust Building, Baltimore; Clifford J. Ellis, Western Union Building, Chicago; J. G. Miller, Commonwealth Trust Building, St. Louis; Pacific Hardware and Steel Company, 33–9 Fremont st., 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. noncumulative preferred and $5,000,000 is common. The Pennsylvania Steel Company operates the following works:

BLAST FURNACES—7.

Lebanon Furnaces, Lebanon, Lebanon county, Pa. Two stacks: No. 1, 80 x 18, built in 1845 and rebuilt in 1868 and in 1885; No. 3, 100 x 20, built in 1872–3, put in blast in August, 1873, and rebuilt in 1900; four Massicks & Crooke and four patent 3-pass Cowper stoves; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron; total annual capacity, 130,000 tons. Equipped with one pig-iron casting machine.—*Active in 1903.*

Lochiel Furnace, Harrisburg, Dauphin county, Pa. One stack, 65 x 14, 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.—*Active in 1903.*

Steelton Furnaces, Steelton, Dauphin county, Pa. Four stacks: No. 1, 60 x 14, 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; four

Whitwell stoves. Nos. 3 and 4, each 70 x 16; No. 3 first put in blast in February, 1884, and No. 4 first put in blast in April, 1884; each has four Whitwell stoves. Fuel, mixed anthracite coal and coke; ores, foreign and domestic hematite and magnetite; product, Bessemer, low-phosphorus, and basic pig iron and spiegeleisen; total annual capacity, 330,000 tons. One pig-iron casting machine. Molten metal is taken from the furnaces to the Bessemer converters and open-hearth furnaces at Steelton.—*Active in 1903.*

Total annual capacity of the 7 furnaces: 500,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1.

Pennsylvania Steel Works, Steelton, Dauphin county, Pa. Bessemer steel works built in 1865–7; three 10-gross-ton converters; first blow made in June, 1867; 4 iron and 2 spiegel cupolas; annual capacity, 400,000 tons of ingots; molten metal from the Steelton Furnaces is used in the Bessemer converters; product, blooms and slabs for structural purposes, plates, nail slabs, rails of all sections, street rails, crossings, frogs, switches, steel castings, and merchant steel generally.

One 26-inch rail mill, built in 1867–8, has 5 horizontal heating furnaces; 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; annual capacity, 300,000 tons of rails. No. 2 blooming mill, 30¾-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. Hammer mill contains 3 hammers, (one 1, one 4, and one 12-ton.)

Open-hearth steel plant, containing two 15-gross-ton furnaces, erected in 1875; furnaces removed in 1883 and two 30-ton furnaces erected; one 5-ton furnace added in 1889, two 15-ton furnaces added in 1890, one 7-ton furnace added in 1892, six 50-ton furnaces added in 1893, and two 40-ton furnaces added in 1900; both acid and basic open-hearth steel are produced; plant now contains 9 basic furnaces (two 15, two 30, and five 45-gross-ton) and 5 acid furnaces (one 10, one 20, and three 45-gross-ton); the 10 and 20-gross-ton acid furnaces are used for the manufacture of steel castings; total annual capacity, 250,000 tons of ingots, worked into boiler, structural, and special steel, and 18,000 tons of castings. Molten metal is used in the open-hearth furnaces.

Merchant mill, erected in 1883, contains one 13 and one 20-inch train of rolls; billet mill, erected in 1887, contains one 20-inch train; slabbing mill, erected in 1893, contains one set of hous-

ings and includes two horizontal rolls 26 inches in diameter and two vertical rolls 20 inches in diameter. There are also machine shops and the necessary repair shops connected with the works. Fuel used in all departments, producer gas and coal.

Total annual capacity of the rolling mills and steel works: Bessemer ingots, 400,000 gross tons; open-hearth ingots, 250,000 tons; steel castings, 18,000 tons; steel rails, 300,000 tons; steel billets and slabs, 200,000 tons; other finished products, 140,000 tons.

BRIDGEBUILDING AND FROG, SWITCH, AND SIGNAL WORKS.

Bridge and Construction Department, Steelton, Pa. Product, railroad and highway bridges; also erects iron and steel buildings; annual capacity, from 30,000 to 40,000 tons.

Frog, Switch, and Signal Departments, Steelton, Pa. 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, Pa. Product, bolts and rivets for the use of the company only.

Polished Steel Shafting Department, Steelton, Dauphin county, Pennsylvania. Product, polished steel shafting; sizes, from $1\frac{13}{16}$ inches to $5\frac{7}{16}$ inches in diameter; annual capacity, 5,000 tons.

FORGING WORKS AND IRON AND STEEL FOUNDRIES.

Forging Department, Steelton, Pa. Product, miscellaneous medium and heavy steel forgings; annual capacity, 5,000 tons.

Steel Foundry Department, Steelton, Pa. Built in 1902; product, acid open-hearth steel castings; annual capacity, 18,000 tons.

The company also operates an iron foundry at Steelton, at which castings for its own consumption are made.

IRON-ORE MINES AND RAILROADS.

The company has also purchased from Mrs. Annie C. Rogers and some members of the Grubb family the holdings in the Cornwall iron-ore banks and associated interests of the heirs of G. Dawson Coleman. It has also acquired their interests in the Cornwall and Lebanon Railroad. This road is 21.66 miles long.

LIMESTONE QUARRY AND COKE OVENS.

The company owns and operates an extensive limestone quarry at Steelton, Pennsylvania, adjoining its property at that place. The limestone quarried is all consumed by the Steelton Furnaces.

It is also building 90 Semet-Solvay by-product coke ovens at Lebanon, Pa., to furnish coke for its Lebanon Furnaces. The ovens will probably be completed in July, 1904, and will have an annual capacity of about 200,000 net tons.

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, Md., and Girard Building, Philadelphia. *Officers at Sparrows Point:* F. W. Wood, President; Charles Pettigrew, Superintendent; and R. K. Wood, General Agent. *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 Agents: Richard Peters, Girard Building, Philadelphia; A. E. Aeby, Empire Building, New York; Charles S. Clark, 70 Kilby st., Boston; R. C. Hoffman & Co., Continental Trust Building, Baltimore; Clifford J. Ellis, Western Union Building, Chicago; J. G. Miller, Commonwealth Trust Building, St. Louis; Pacific Hardware and Steel Company, 33-9 Fremont st., San Francisco; and Sanders & Co., 110 Cannon st., London, E. C., England. The Maryland Steel Company operates the following works:

BLAST FURNACES—4.

Maryland Steel Company, Sparrows Point, Baltimore county, Maryland. 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, 400,000 tons. Furnaces are equipped with one double Heyl & Patterson pig-iron casting machine. Molten metal is conveyed from the furnaces to the Bessemer steel converters of the company.—*Active in 1903.*

Total annual capacity of the 4 furnaces: 400,000 gross tons.

ROLLING MILLS AND STEEL WORKS—1.

Maryland Steel Company, Sparrows Point, Baltimore county, Maryland. 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 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, bituminous coal and petroleum. Brand, "Maryland."

Total annual capacity of the rolling mills and steel works: Bessemer steel ingots, 500,000 gross tons; rolled products, 400,000 tons.

SHIPBUILDING WORKS AND IRON FOUNDRY.

Maryland Steel Company, (Marine Department,) Sparrows Point, Maryland. 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 200 Otto-Hoffman by-product coke ovens; annual capacity, 400,000 net tons.

AMERICAN IRON AND STEEL MANUFACTURING COMPANY.

American Iron and Steel Manufacturing Company; general offices, Lebanon, Pa. *Officers at Reading:* J. H. Sternbergh, President, and H. M. Sternbergh, Vice-President and General Manager. *Officers at Lebanon:* H. M. M. Richards, Treasurer; Charles M. Hallman, Secretary; and James Lord, Assistant Manager of Lebanon plants.

Sales Agents: V. A. Moore and Charles P. King, Atlanta, Ga.; F. W. Brigham, Boston, Mass.; American Iron and Steel Manufacturing Company, Postal Telegraph Building, New York; Francis T. West, Chicago, Ill.; and Hughson & Merton, San Francisco, California.

Capital stock, $20,000,000, of which $3,000,000 is 5 per cent. preferred and $17,000,000 is common. The par value of the preferred stock is $50 per share, fully paid, and the par value of the common stock is $50 per share, upon which $5 per share has been paid. The company operates the following works:

ROLLING MILLS—4.

Central Works, Lebanon, Lebanon county, 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 bar, 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, turnbuckles, etc.; annual capacity, 50,000 tons. Fuel, bituminous coal.

East Works, Lebanon, Lebanon county, Pa. Built in 1891, destroyed by fire in 1893, and rebuilt and put in operation during the same year; 12 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (20-inch muck bar and 10 and 18-inch finishing); product, muck bar and merchant bar iron; annual capacity, 24,000 tons of refined bar iron. Fuel, bituminous coal.

Reading Works, Reading, Berks county, 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; annual capacity, 40,000 tons. Fuel, bituminous coal.

West Works, Lebanon, Lebanon county, Pa. Built in 1882–3; 11 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 20-inch muck bar, one tandem 12 and 8-inch finishing, and one 12-inch finishing); product, muck bar and merchant bar iron; annual capacity, 22,000 tons of refined bar iron. Fuel, bituminous coal.

Total annual capacity of the 4 rolling mills: 136,000 tons of bar iron and steel and other finished rolled and forged products.

BOLT, NUT, AND RIVET WORKS—2.

Central Works, Lebanon, Pa. Product, bolts, nuts, washers, etc. Sizes and kinds: bolts, machine, carriage, track, plow, and elevator, (also lag screws, bolt ends, etc.,) from $\frac{3}{16}$ of an inch to $4\frac{1}{2}$ inches in diameter; nuts, hot-pressed and cold-punched, for bolts from $\frac{3}{16}$ 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 in 1896; product, every variety of bolts, nuts, washers, lag screws, turnbuckles, boiler and structural rivets, cap and set screws, 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 forgings, 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.

Reading Works, Reading, Pa. Product, forgings for cars, bridges, buildings, etc.

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, 6,000 tons.

The company also operates iron and brass foundries at Lebanon, Pennsylvania. Product, gray iron machine castings and cast-iron washers and brass bearings and brass parts for machinery; annual capacity, 3,000 tons of gray iron castings.

KEG FACTORY AND OTHER PROPERTIES.

The company operates a keg factory at Lebanon. Product, kegs, barrels, and boxes; annual capacity, 300,000 kegs, 8,000 barrels, and 50,000 boxes. It also owns 24 acres of undeveloped natural-gas land on Neville Island, in Allegheny county, Pa., near Pittsburgh, which is suitable for manufacturing purposes.

TRADE MARKS.

For best refined bar iron, the letter A inclosed in a diamond; 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.

READING IRON COMPANY.

Reading Iron Company; general offices, Baer Building, Reading, Pa. *Officers:* George F. Baer, Chairman of the Board of Directors; F. C. Smink, President; George Schuhmann, General Superintendent; George B. Harris, Treasurer; and George W. Delany, Secretary.

Capital stock, $1,000,000, all of which is common. The Reading Iron Company operates the following works:

BLAST FURNACES—2.

Crumwold Furnace Department, Emaus, Lehigh county, Pa. One stack, 66 x 16, completed and first put in blast 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 1903.*

Keystone Furnace Department, Reading, Berks county, Pa. One stack, 80 x 17, built in 1898–9 and first blown in May 1, 1899; four Massicks & Crooke stoves, 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 1903.*

Total annual capacity of the 2 furnaces: 145,000 gross tons.

ROLLING MILLS—4.

Montour Rolling Mills Department, Danville, Montour county, 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, iron and steel rails, bar iron, angle iron, iron and steel angle and plain splice bars, and grooved skelp iron; annual capacity, 60,000 tons. Fuel, anthracite and bituminous coal.

Ninth Street Mills Department, Reading, Berks county, Pa. Built in 1868 and remodeled in 1889 and 1902; 15 double puddling furnaces, 6 heating furnaces, and 4 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, skelp, socket, and bar iron; annual capacity, 60,000 tons. Fuel, bituminous coal.

Oley Street Mills Department, Reading, Berks county, Pa. Built in 1896–7; 12 double puddling furnaces, 2 scrap furnaces, 4 gas heating furnaces, and 2 trains of 3-high rolls (one 20-inch puddle and one 23-inch skelp); product, skelp iron; annual capacity, 35,000 tons. Fuel, bituminous coal.

Sheet Mill Department, Reading, Berks county, Pa. Built in 1863; 10 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (one 22-inch puddle and two 22-inch plate); product, sheared skelp and plate iron; annual capacity, 25,000 tons. Fuel, bituminous coal.

Total annual capacity of the 4 rolling mills: 180,000 tons of rails, bars, angles, skelp, plates, and other finished rolled products.

TUBE DEPARTMENT.

Tube Works Department, Reading, Berks county, Pa. Built in 1856; 10 pipe mills; product, wrought-iron pipe, boiler tubes, oil-well tubing and casing, trolley poles, and other tubular goods; sizes of pipe, from ⅛ of an inch to 12 inches; annual capacity, 115,000 tons.

FOUNDRY AND FORGE DEPARTMENTS.

Scott Foundry Department, Reading, Berks county, Pa. Built in 1854; product, all classes of rolling-mill and blast-furnace machinery, large iron castings, cotton compressors, sugar mills, and all other general machinery; annual capacity, 6,000 tons.

Steam Forge Department, Reading, Berks county, 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 tons of light forgings and 10,000 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, containing 2,695 acres, all located in Putnam county, New York. 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 owns 7,538 acres of coal lands located at Mostollar, Somerset county, Pa., which are now in operation and are producing daily about 400 tons of bituminous coal.

In addition to the above the company owns 311 acres of timber land at New Ringgold, Schuylkill county, Pa., and 600 acres of timber and farming lands at Millerstown, Perry county, Pa.

GLASGOW IRON COMPANY.

Glasgow Iron Company; general offices, Pottstown, Montgomery county, Pa.; branch office, Harrison Building, Philadelphia. *Officers:* 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 street, New York City, and 272 Franklin street, Boston, Massachusetts.

Capital stock, $360,000. The company operates or leases the following blast furnaces and rolling mills and steel works:

BLAST FURNACES—1 LEASED.

Anvil Furnace, (leased,) Pottstown, Montgomery county, Pa. One stack, 80 x 17, built in 1867 and blown in in December, 1867; remodeled in 1889; three fire-brick stoves, 76¼ x 19; fuel, anthracite coal and coke; ores, magnetic and hematite; product,

special pig iron; annual capacity, 50,000 tons. Brand, "Anvil." (Owned by the Pottstown Iron Company.)—*Idle since 1893.*

Annual capacity: 50,000 gross tons of special pig iron.

ROLLING MILLS AND STEEL WORKS—1 OWNED AND 1 LEASED.

Glasgow Iron and Steel Works, ninth ward, Pottstown, Montgomery county, Pa. Puddle mill built in 1874; 8 double puddling furnaces and one train of muck rolls; rotary squeezer; steam and water power; annual capacity, 10,000 tons. 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, man-holes, man-hole saddles for boilers, pressed steel boiler lugs, pipe flanges, etc., and buckle plates. Fuel, manufactured gas and bituminous coal.

Pottstown Iron Works, (leased,) Pottstown, Montgomery county, Pa. Built in 1863 and enlarged in 1867; 22 double puddling furnaces, 13 Siemens heating 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 up to 36 inches in width); 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 these works. Steel works, built in 1885–6, contain three 10-gross-ton basic-Bessemer steel converters and a 36-inch blooming mill; first blow made July 1, 1886; steel plant idle and may be dismantled; one 12-gross-ton basic open-hearth steel furnace dismantled. (Owned by the Pottstown Iron Company.)

Total annual capacity of the 2 rolling mills and steel works: 196,000 tons of rolled iron and steel and 250,000 kegs of cut nails.

SUSQUEHANNA IRON AND STEEL COMPANY.

Susquehanna Iron and Steel Company; general offices, Columbia, Pa. *Receivers:* P. E. Slaymaker and C. C. Kauffman. *Officers:* C. C.

Kauffman, General Manager, and B. F. Conner, General Superintendent, Columbia.

Capital stock, $1,500,000, all preferred. The company operates the following blast furnaces and rolling mills:

BLAST FURNACES—2.

Aurora Furnace, Wrightsville, York county, 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." —*Active in 1903.*

Vesta Furnace, Vesta, Lancaster county, 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." —*Active in 1903.*

Total annual capacity of the 2 furnaces: 60,000 gross tons.

ROLLING MILLS—5.

Columbia Mill, Columbia, Lancaster county, 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, Lancaster county, 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, Lancaster county, 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, Lancaster county, 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, coal. Brand, "Union Street."

York Mill, York, York county, Pa. Built in 1869; 8 double pud-

dling 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 ⅛ of an inch to 2 inches; annual capacity, 37,500 tons.

WORTH BROTHERS COMPANY.

Worth Brothers Company; general offices, Coatesville; branch offices, Arcade Building, Philadelphia; Havemeyer Building, New York; Board of Trade Building, Boston; Union Trust Building, Cincinnati; and Monadnock Block, Chicago. *Officers:* J. Sharpless Worth, President; W. P. Worth, Secretary and Treasurer; and L. F. Nagle, General Manager of Sales.

District Sales Agents: Robert S. Groves, Arcade Building, Philadelphia; M. J. Mulcahy, Havemeyer Building, New York; F. H. Gawthrop, Board of Trade Building, Boston; C. A. Hunt, Union Trust Building, Cincinnati, and National Bank of Commerce Building, St. Louis; and McClernon & Orr, Monadnock Block, Chicago. The company operates or controls the following works:

ROLLING MILLS AND STEEL WORKS—2.

Brandywine Rolling Mills, Coatesville, Chester county, 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, 6 soaking pits, 3 trains of rolls, (one 28 x 90, one 3-high 36 x 132, and one 3-high 42 x 152-inch,) and 8 electric traveling cranes, (one 50-ton, one 15-ton, and six 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 two 154-inch, two 132-inch, and one 102-inch hydraulic plate shears, as well as one 110-inch steam shear and one rotary shear, the latter capable of trimming heads 1 inch thick by 12 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 three 75 and three 160 kilowatt generators and one large air compressor.

Brandywine Rolling Mills, Coatesville, Pa. Open Hearth Steel Department: Built in 1895–6; one 35-gross-ton acid and five 35-gross-ton and four 50-gross-ton basic furnaces, 61 gas producers, 5 electric traveling cranes, (one 80-ton ladle, three 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, 230,000 tons of ingots. Fuel, manufactured gas and coal. This department includes two Wellman-Seaver electric charging machines, one high-type and one low-type.

Product, sheared steel plates for all purposes, including locomotive firebox, locomotive boiler, marine boiler, stationary boiler, tank, and structural work, all sizes of machine flanged and dished heads, machine flanged man-holes, saddles, pressed steel man-heads, yokes, and various other pressed articles; annual capacity, 220,000 tons of finished plates.

Viaduct Iron Works, Coatesville, Pa. Rolling Mill Department: Built in 1838; 2 double puddling furnaces, 10 heating furnaces, 5 trains of rolls, (two bar and one 50 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, 25,000 tons. Fuel, coal. (Operated by the Coatesville Rolling Mill Company.)

Total annual capacity of the 2 rolling mills and steel works: 230,000 tons of ingots and 245,000 tons of plates, skelp, and sheets.

BLOOMARY AND TUBE WORKS.

Viaduct Forge, Coatesville, Pa. Built in 1898 and since enlarged; 16 charcoal fires and 2 steam hammers; product, blooms used by the works in the manufacture of boiler tubes; annual capacity, 10,000 tons. Fuel, charcoal. (Operated by the Coatesville Rolling Mill Company.)

Viaduct Tube Works, Coatesville, Pa. Built in 1900; one bending and 2 welding furnaces; product, lap-welded knobbled charcoal iron boiler tubes exclusively; sizes, from 1¼ to 8 inches; annual capacity, 12,500 tons. Fuel, producer gas. (Operated by the Coatesville Rolling Mill Company.)

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; W. W. Lukens, Assistant Secretary and Assistant Treasurer; and W. H. Mitchell, Sales Agent.

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 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; five 50-gross-ton Siemens basic open-hearth steel furnaces and three sets of 4-hole soaking pits; first open-hearth steel made May 31, 1903; product, steel ingots; annual capacity, 140,000 tons. One 28-inch blooming and one 42-inch universal interchangeable mill; product, steel billets, bars, and universal plates; annual capacity, 120,000 tons. Fuel, coal and producer gas. Brand, "AW." A machine shop is connected with the works.

Schuylkill Iron Works, Conshohocken, Montgomery county, 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 three 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 25,000 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. (Formerly operated by the Alan Wood Company; acquired by the Alan Wood Iron and Steel Company on July 6, 1903.)

Total annual capacity of the 2 rolling mills and steel works: 140,000 gross tons of steel ingots, 120,000 tons of steel billets, bars, or universal plates, 11,000 tons of muck bar, 15,000 tons of bar iron and steel, 5,000 tons of sheet iron and steel, and 25,000 tons of flue and plate iron and steel.

LUKENS IRON AND STEEL COMPANY.

Lukens Iron and Steel Company; general offices, Coatesville, Chester county, Pa.; branch offices, Arcade Building, Fifteenth and Market sts.; Philadelphia; Whitehall Building, 17 Battery Place, New York; Board of Trade Building, 131 State st., Boston; Continental Trust Building, (temporary office, 12 Wilson Building,) Baltimore; and 626–30 South Peters st., 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; J. F. Corlett & Co.; Cleveland; Charles Neblett, Cincinnati; and Thomas Robertson & Co., Montreal, Canada.

Capital stock, $500,000, all common. The Lukens Iron and Steel Company operates the following works:

ROLLING MILLS AND STEEL WORKS—1.

Lukens Iron and Steel Works, Coatesville, Chester county, Pa. Established in 1810. Puddle mill contains 6 double puddling furnaces, one rotary squeezer, and one train of muck rolls. This mill is operated by steam-power. It occupies the site of the first mill which rolled boiler plates in the United States.

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; 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 four reverberatory heating furnaces, and one 134-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; also machine-flanged boiler heads and patent hydraulic-pressed boiler braces; 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 ¼ of an inch thick have been rolled on this mill; also 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 two 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.

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, 250,000 tons.

Two open-hearth steel plants: Plant No. 1 contains one 40-gross-ton acid furnace and five 40-gross-ton basic furnaces; first steel made early in 1892. Plant No. 2 contains six 50-gross-ton basic furnaces; first steel made April 7, 1900. Total annual capacity, 225,000 tons of basic and 25,000 tons of acid ingots. Also produces from 25 to 100 tons per month of steel castings for its own use. The plants are liberally equipped with hydraulic and electric cranes, gas producers, and other necessary appliances.

Fuel used in all departments, manufactured gas and bituminous coal.

Total annual capacity of the rolling mills and steel works: open-hearth steel ingots, 250,000 gross tons; slabs and billets, 250,000 gross tons; boiler, ship, bridge, and other plates, 380,000 net tons.

CENTRAL IRON AND STEEL COMPANY.

Central Iron and Steel Company; general offices, Harrisburg. *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: Boston, George H. Lloyd & Co.; New York City, William H. Wallace & Co.; Philadelphia, Charles K. Barns & Co.; and Baltimore, R. C. Hoffman & Co.

Capital stock, $3,000,000, all common. The Central Iron and Steel Company was formed by the consolidation of the Central Iron

Works, the Chesapeake Nail Works, the Paxton Rolling Mills, and the Paxton Furnaces. It owns or operates the following works:

BLAST FURNACES—2.

Paxton Furnaces, Harrisburg, Dauphin county, 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, and basic open-hearth pig iron; total annual capacity, 85,000 tons. Brands, "Paxton" and "Silver Spring." (Formerly operated by the Paxton Iron and Steel Company.)—*Active in 1903.*

Total annual capacity of the 2 furnaces: 85,000 gross tons.

ROLLING MILLS AND STEEL WORKS—4.

Central Iron Works, Harrisburg, Pa. First mill, built in 1853 and remodeled in 1896, has 2 coal heating furnaces and one 25-inch roughing and one Lauth 3-high 25-inch finishing train of rolls with small tables for handling plates, straightening rolls, and one Morgan shear; annual capacity, 14,000 tons. New universal mill, built in 1892, has 4 heating furnaces and one train of 48-inch rolls capable of rolling plates 42 inches wide; annual capacity, 70,000 tons. New boiler plate mill, built in 1899, has 3 coal heating furnaces and one 3-high 89 x 28-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.

Open Hearth Steel Works, Harrisburg, Pa. Built in 1903–4; steel not made down to May 15, 1904; four 50-gross-ton basic furnaces; product, ingots; annual capacity, 100,000 tons. Fuel, gas coal.

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.*

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 136-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.

Total annual capacity of the operated rolling mills and steel works: 100,000 tons of open-hearth ingots and 200,000 tons of plates.

CAMBRIA STEEL COMPANY.

Cambria Steel Company, P. O. drawer 1573, Central Post Office, Philadelphia; general offices, Arcade Building, southeast corner Fifteenth and Market streets, Philadelphia. *Officers at Philadelphia:* Powell Stackhouse, President; John W. Townsend, Vice-President; Alexander P. Robinson, Treasurer and Assistant Secretary; Edward T. Stuart, Assistant Treasurer; and D. B. Gehly, Secretary. *Officers at Johnstown:* Charles S. Price, General Manager, and H. S. Endsley, Solicitor and General Agent.

Sales Offices: New York, H. L. Waterman, 71 Broadway; Chicago, C. J. Ellis, 209 Western Union Building; Toledo, Ohio, for rails, W. E. C. Coxe, 316 The Nasby; Cincinnati, Ohio, J. L. Adams, Union Trust Building; Cleveland, for structural and merchant steel, the Bourne-Fuller Company, Hickox Building; Atlanta, Georgia, F. I. Stone & Co., Century Building; St. Louis, H. P. Hubbell, Chemical Building; Pittsburgh, William McLain, 917 Park Building; and Boston, Mass., structural steel, H. W. Hayes, 101 Tremont street.

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 it leased from the Cambria Iron Company in 1898:

BLAST FURNACES—6 COMPLETED AND 1 BUILDING.

Cambria Furnaces, Johnstown, Cambria county, Pa. Six completed stacks and one stack building. Completed stacks: 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, 95¾ 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; No. 6, 87 x 22, was first blown in July 20, 1879, and rebuilt in 1893, 1896, 1900, and 1903. The furnaces are equipped with twenty-four Cowper-Kennedy stoves and three pig-iron casting machines. Fuel, Connellsville and Otto-Hoffman coke; ores, Lake Superior hematite and native and foreign manganiferous; product, Bessemer and basic open-hearth pig iron and spiegeleisen and ferromanganese; total annual capacity, 650,000 tons. The furnace now being erected will be known as No. 7 and will be 85 x 22 feet; it will have four Kennedy stoves, each 24 x 100 feet, and will have

an annual capacity of 150,000 tons of Bessemer and basic pig iron and be equipped with two casting machines.—*Active in 1903.*

Total annual capacity of the 6 completed furnaces, 650,000 gross tons; of the building furnace, 150,000 tons: total, 800,000 tons.

ROLLING MILLS AND STEEL WORKS.

Cambria Rolling Mills and Steel Works, Johnstown, Pa. First built in 1853; Bessemer steel works made their first blow July 10, 1871; rebuilt and enlarged in 1889 and 1891 and remodeled in 1900; four 12½-gross-ton converters; annual capacity, 600,000 tons of ingots.

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.

Blooming mill contains 7 pit-hole heating furnaces, one 2-high 48-inch blooming mill, one set; one 2-high 40-inch blooming mill, one set; and one 3-high 30-inch billet, slab, and beam mill, four sets, with 2 regenerative reheating furnaces.

Rolling mills contain 11 Siemens furnaces, 4 continuous furnaces, 24 reverberatory furnaces, one 28-inch rail mill, three sets; one 21-inch light rail and structural mill, 3 sets; two 21-inch structural and bar mills, three sets each; one 12-inch splice bar mill, four sets; one 22-inch 2-high puddle mill, two sets; and one 22-inch 2-high plate mill, two sets; also the following merchant steel mills: one 16-inch 3-high mill; one 10 and 12-inch train, nine sets; one 9-inch train, six sets; one 8-inch mill, five sets; one 10-inch train, eight sets; one 12-inch train, four sets; one 14-inch train, eight sets; one 20-inch train, three sets; and one 12-inch cold-rolling train. Also a cold-drawing plant, with full equipment of furnaces, shears, hammers, and special machinery.

Open Hearth Plant No. 2, Franklin, Johnstown. Built in 1900–1; ten 50-gross-ton stationary furnaces (9 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, 216,000 tons of basic ingots, 24,000 tons of acid ingots, and 100,000 tons of slabs. Adding five 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 120,000 tons.

Fuel used in all departments, coal and producer gas.

Total annual capacity of the rolling mills and steel works: Bessemer steel ingots, 600,000 gross tons; open-hearth steel ingots, (completed and building furnaces,) 405,000 tons; finished steel, 300,-

000 tons of steel rails, and 375,000 tons of structural shapes, plates, and steel for tire, spring, toe-calk, machinery, plow steel, finger bars, harrow discs, rake teeth, etc.

CAR-AXLE AND BOLT, NUT, AND RIVET WORKS.

Car Axle Department, Johnstown. Product, open-hearth steel car and locomotive axles toughened by the Coffin process or oil tempered and annealed; annual capacity, 55,000 axles.

Bolt, Nut, and Rivet Department, Johnstown. Product, all sizes of iron and steel bolts, nuts, and rivets; annual capacity, 6,000 tons.

FORGINGS AND COLD-ROLLED AND COLD-DRAWN SHAFTING.

Forging Department, Johnstown. 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 25,000 tons.

Gautier Department, Johnstown. 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, $\frac{3}{16}$ of an inch to 7 inches; squares, $\frac{3}{8}$ 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, 12,000 tons. Does not cold-roll or cold-draw iron shapes of any kind.

STEEL CARBUILDING WORKS.

Steel Carbuilding Department, Johnstown. Product, all kinds of steel cars; also composite cars with steel underframes; annual capacity, 4,500 cars. All cars are built of rolled shapes.

COAL LANDS, COKE OVENS, IRON-ORE MINES, ETC.

The Cambria Steel Company operates extensive coal mines in Cambria county; also 260 Otto-Hoffman coke ovens at Johnstown and 508 bee-hive ovens in Fayette county, Pennsylvania.

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 the stock of the Mahoning Ore and Steel Company, which operates the Mahoning mine, in the Mesabi Range, in Minnesota.

The company also owns all the stock of the Manufacturers' Water Company, at Johnstown.

It also owns a controlling interest in the Juniata Limestone Company, Limited, which operates limestone quarries at Carlim, Blair county, Pa., and owns and operates the Naginey limestone quarries in Mifflin county, Pennsylvania.

JONES AND LAUGHLIN STEEL COMPANY.

Jones and Laughlin Steel Company; general offices, Third avenue and Ross street, Pittsburgh, Pa. *Officers:* B. F. Jones, Jr., President; Willis L. King, Vice-President and General Sales Agent; James B. Laughlin, Treasurer; William C. Moreland, Secretary; William Larimer Jones, General Manager; Thomas O'Conor Jones, Assistant General Manager; Thomas K. Laughlin, Assistant Treasurer; and Wendell Van Hook, Auditor.

Branch Offices: Lake and Canal sts., (also warehouse,) Chicago; Erie County Savings Bank Building, Buffalo, N. Y.; 131 State st., Boston, Mass.; Union Trust Building, Cincinnati, Ohio; Arcade Building, Philadelphia, Pa.; and 220 Broadway, New York.

Sales Agents: Otis, Bonnell & Co., Cleveland; F. A. Goodrich & Co., Detroit, Mich.; and the F. A. Goodrich Iron and Steel Company, St. Louis, Mo.

Capital stock, $30,000,000, all common. The company operates the following works:

BLAST FURNACES—6.

Eliza Furnaces, Pittsburgh, Pa. 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 three Uehling pig-iron casting machines. (Formerly operated by Jones & Laughlins, Limited.)—*Active in 1903.*

Soho Furnace, Pittsburgh, Pa. 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, 100,000 tons. Brand, "Soho." Slag granulating pits are connected with this furnace. (Formerly operated by Jones & Laughlins, Limited.)—*Active in 1903.*

Total annual capacity of the 6 furnaces: 1,035,000 gross tons.

ROLLING MILLS AND STEEL WORKS—2.

American Iron and Steel Works, Pittsburgh, Pa. Works in the

Twenty-fourth and Twenty-fifth wards, South Side. Rolling mill built in 1852; 26 heating furnaces, 21 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, one 22-inch and one 26-inch structural, one 20-inch, two 16-inch, and two 13-inch bar, and two 12-inch, two 10-inch, and five 8-inch guide,) and 3 hammers.

Bessemer Steel Works built in 1886; three 10-gross-ton converters, 4 cupolas, and 34 soaking pits; first blow made August 19, 1886; annual capacity, 800,000 tons of ingots. Molten metal from the Eliza Furnaces is used in the converters.

Open Hearth Steel Department added in 1895 and enlarged in 1896 and 1902; one 25-gross-ton acid and one 250 and six 40-gross-ton basic furnaces; first steel made September 28, 1895; annual capacity, 225,000 tons of ingots. Molten metal from the Eliza Furnaces is used in the open-hearth furnaces.

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, couplings, hangers, pillow blocks, and pulleys; annual capacity, 900,000 tons of steel billets and blooms and 800,000 tons of finished material. Fuel, coal, natural gas, and producer gas. Brand, "American." (Above works formerly operated by Jones & Laughlins, Limited.)

Soho Department, Second avenue, near Brady street, Pittsburgh, Pa. Built in 1859; 2 Siemens regenerative furnaces, 10 Siemens regenerative pit furnaces, and 3 trains of rolls, including a train capable of rolling plates 12 inches thick, 100 inches wide, and 15 tons in weight; product, steel plates; annual capacity, 100,000 tons. Steel department contains 4 acid open-hearth steel furnaces (one 15 and three 25-gross-ton); first steel made November 29, 1883; annual capacity, 70,000 tons of ingots. Fuel, coal and natural gas. (Formerly operated by Jones & Laughlins, Limited.)

Total annual capacity of the 2 rolling mills and steel works: Bessemer steel ingots, 800,000 gross tons; open-hearth ingots, 295,000 tons; steel billets and blooms, 900,000 tons; plates, sheets, structural shapes, and other finished rolled material, 900,000 tons.

SPIKE, RIVET, AND BOLT DEPARTMENTS.

Spike, Rivet, and Bolt Departments, American Iron and Steel Works, Pittsburgh, Pa. Product, structural and tank rivets, made from either Bessemer or basic open-hearth steel, with button-head, counter-sunk, 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, 8,000 tons of rivets, spikes, bolts, etc.

STRUCTURAL MATERIAL FITTING SHOPS.

Structural Material Fitting Shops, American Iron and Steel Works, Pittsburgh. These shops are provided 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, 36,000 tons.

CHAIN FACTORY.

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, agricultural, conveyor, log, and binding chains; sizes: machine-made common and crane chains from $\frac{3}{16}$ 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 tons.

IRON AND STEEL FOUNDRIES.

Foundry Department, American Iron and Steel Works, Pittsburgh. One steel and two iron foundries. Product, iron and steel castings; annual capacity, 17,500 tons of iron and 2,500 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.

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, $\frac{5}{32}$ of an inch to 5 inches; squares, $\frac{3}{16}$ of an inch to 4 inches; hexagons, $\frac{1}{4}$ of an inch to $1\frac{7}{8}$ inches; pentagons, $\frac{5}{16}$ of an inch to $\frac{1}{4}$ of an inch; flats, from $\frac{1}{4}$ of an inch to $2\frac{15}{16}$ inches thick and from $\frac{5}{16}$ of an inch to 3 inches wide; angles, from $1\frac{5}{16}$ inches to 3 by $2\frac{1}{4}$ inches; and zees, from $1\frac{5}{8}$ by $2\frac{1}{16}$ by $1\frac{5}{8}$ to $1\frac{1}{2}$ by 1 by 2 inches. Annual capacity, 30,000 tons of cold-rolled and 45,000 tons of cold-drawn steel products. Does not cold-roll or cold-draw iron shapes of any kind.

FORGE AND MACHINE SHOPS, SLAG GRANULATING PITS, ETC.

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 miscellaneous special devices.

Slag Granulating Department. Connected with Soho Furnace are slag granulating pits; annual capacity, about 40,000 net tons.

IRON-ORE MINES.

The Jones and Laughlin Steel Company owns the capital stock of the Interstate Iron Company, which amounts to $2,000,000, and which operates the Virginia and Buhl mines in Minnesota, which have an annual capacity of about 1,000,000 tons of Bessemer and non-Bessemer iron ore.

In addition the Jones and Laughlin Steel Company has several long-time contracts for iron ore in the Mesabi and Marquette Ranges of the Lake Superior iron-ore region.

COAL LANDS, COKE OVENS, ETC.

The Jones and Laughlin Steel Company also owns all the capital stock of the Vesta Coal Company, amounting to $2,500,000. The latter company owns about 6,000 acres of land in Washington county, Pennsylvania, in the fourth pool of the Monongahela river. Its mines have an annual capacity of about 1,600,000 tons of coal.

The Jones and Laughlin Steel Company also owns and operates 1,268 coke ovens at Pittsburgh, with an annual capacity of 900,000 net tons of coke. In addition it is now building 500 coke ovens at the same place.

It also owns a controlling interest in the Blair Limestone Company, which has a capital stock of $50,000. This company owns about 30 acres of limestone land near Hollidaysburg, Pa. Its quarries have an annual capacity of about 300,000 tons.

DOCKS AT ASHTABULA, OHIO.

The Jones and Laughlin Steel Company also owns all the capital stock of the Angeline Dock Company, which owns large docks at Ashtabula, Ohio.

PITTSBURGH STEEL COMPANY.

Pittsburgh Steel Company; general offices, 307 Fourth ave., Pittsburgh. New York office, 29 Broadway. *Officers:* Wallace H. Rowe, President; Edwin Bindley, Vice-President; Charles E. Beeson, Secretary; William C. Reitz, Treasurer; and F. H. Forman, General Sales Agent. Capital stock, $3,000,000. The Pittsburgh Steel Company operates the following works:

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 three 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 blooming mills may be 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.

Total annual capacity of the works: 30,000 gross tons of 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.

PRESSED STEEL CAR COMPANY.

Pressed Steel Car Company; general offices, Farmers Bank Building, Pittsburgh. *Domestic Offices:* 243 Washington street, Jersey City, N. J.; Blair & Co. Building, 24 Broad st., New York; and Fisher Building, Chicago. *Foreign Offices:* 20 Broad st. House, London, E. C., England; 68½ Pitt st., Sydney, New South Wales, Australia; and Calle Gante Num 8, Mexico, D. F., Mexico. *Officers at New York:* F. N. Hoffstot, President, and A. H. Larkin, Secretary. *Officers at Pittsburgh:* J. W. Friend, Vice-President; P. G. Jenks, Treasurer; S. E. Moore, Auditor; and G. E. Macklin, General Manager. *Officers at McKees Rocks:* C. A. Lindstrom, Chief Engineer; C. Flinn, General Superintendent; E. E. Forgeus, Purchasing Agent; and J. V. Maher, General Freight Agent.

Sales Managers: O. C. Gayley, Eastern District, New York; C. E. Postlethwaite, Central District, Pittsburgh; and J. H. Mitchell, Western District, Chicago.

Capital stock, $25,000,000, of which $12,500,000 is 7 per cent. noncumulative preferred and $12,500,000 is common. The par value of each share is $100. The company operates the following plants:

CARBUILDING AND OTHER PLANTS—3.

Allegheny Plant, Allegheny, Allegheny county, Pennsylvania. (Formerly called Wood's Run Plant.)

Joliet Plant, Joliet, Will county, Illinois.

McKees Rocks Plant, McKees Rocks, Allegheny county, Pennsylvania.

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, automobile frames, bolsters, centre plates, brake beams, stake pockets, stakes, miscellaneous appliances and specialties for railway cars, and miscellaneous pressed steel specialties. The company is also authorized to deal in all iron and steel products or the products of other metals and wood.

Total annual capacity of the 3 plants: steel and wooden cars, 35,000; truck frames, 120,000; bolsters, 250,000; and underframes, 10,000.

CRUCIBLE STEEL COMPANY OF AMERICA.

Crucible Steel Company of America; general offices, Frick Building, Pittsburgh. *Officers:* William G. Park, Chairman; Frank B. Smith, President and General Manager; Reuben Miller, First Vice-President; Herbert DuPuy, Second Vice-President; Robert E. Jennings, Third Vice-President; Alexander Thomas, Secretary; Julius Bieler, Treasurer; John Neeley, Assistant Treasurer; N. W. Nolen, Auditor; and G. M. Black, General Superintendent.

Capital stock, $50,000,000, of which $25,000,000 is 7 per cent. cumulative preferred and $25,000,000 is common. The company operates or controls the following works:

ROLLING MILLS AND STEEL WORKS—11.

Aliquippa Steel Works, Aliquippa, Beaver county, 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 4 hammers (one 700-lb., one 1,500-lb., one 6-ton, and one 3,000-lb. welding); one 15-gross-ton acid 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 7,500 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."

Atha Steel Works, Harrison, Hudson county, New Jersey. Built in 1888–9 and 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; 24 heating furnaces, 6 trains of rolls, (one 8, two 9, one 10, one 12, and one 16-inch,) and 19 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. (Formerly operated by the Atha Steel Company.)

Beaver Falls Steel Works, Beaver Falls, Beaver county, Pa. Built in 1875; one 24-pot crucible steel-melting furnace, one Siemens and 3 coal-heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 9 and one 16-inch); steam and water power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,500 tons of crucible steel ingots and 4,000 tons of rolled products. Fuel, coal and producer gas. Brand, "Beaver."

Black Diamond Steel Works, (operated by the Park Steel Company,) Pittsburgh, Pa. Built in 1862; 33 puddling furnaces, 60 heating furnaces, and 2 pipe annealing furnaces; two 24, one 30, two 42, and seven 48-pot crucible steel-melting furnaces with an annual capacity of 34,500 tons of ingots; eight 50-gross-ton converting or cementing furnaces with an annual capacity of 3,500 tons; two 18 and three 30-gross-ton acid open-hearth steel furnaces with an annual capacity of 65,000 tons of ingots, and one 50 and two 30-gross-ton basic open-hearth steel furnaces with an annual capacity of 36,000 tons of ingots; 21 trains of rolls, (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, one 18-inch muck, three 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,) and 34 hammers (one 5-ton finishing, one 55-cwt. finishing, one 20-cwt. finishing, six 15-cwt., welding, three 15-cwt. welding, not set up, two 15-cwt. finishing, six 1,250-lb. finishing, seven 700-lb. finishing, three spring-pointing, two blister-breaking, one blacksmith, and one 400-lb. finishing, not set up); 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. A boiler-head flanging shop, a rake-tooth department, and a crucible factory are connected with the works. The company also operates the Lake Superior Copper Mills, which are equipped with hot-rolling and cold-rolling mills; annual capacity of finished copper products, 2,000 tons. Frank B. Smith, President; C. E. Clapp, Vice-President; Alexander Thomas, Secretary; and Julius Bieler, Treasurer.

Crescent Steel Works, Forty-ninth to Fifty-first sts., Pittsburgh, Pa. Built in 1865; 18 puddling furnaces, 39 heating furnaces, 7 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,) 21 hammers, and 5 electric cranes; one 60-pot, two 36-pot, and two 24-pot crucible steel-melting furnaces with an annual capacity of 12,000 tons of ingots; two 15-gross-ton special open-hearth steel furnaces with an annual capacity of 15,000 tons of ingots; 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. A drill-rod shop and a wire factory are connected with the works. Fuel, bituminous coal, coke, and natural and producer gas. Brand, "Crescent."

Howe, Brown & Co. Works, Penn ave. and Seventeenth st., Pitts-

burgh, Pa. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 17 hammers with 22 furnaces, 6 smith-shop fires and 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, one machine shop with 8 lathes, planers, etc.; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 11,000 tons. Open-hearth steel department has one 15-gross-ton acid furnace, built in 1886, and one 20-gross-ton acid furnace, built in 1890, with an annual capacity of 20,000 tons of ingots; product, spring, plow, and machinery steel, and 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 manufactured gas. Brand, "Howe."

La Belle Steel Works, Ridge ave. and Rebecca st., Allegheny, Pa. Built in 1863; 19 forge fires, 28 heating furnaces, 11 Swindell gas producers, one 36-pot and two 42-pot crucible steel-melting furnaces, 15 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; product, high-grade merchant steel of every description; also finished harrow disks, horse hay-rake teeth, springs, and vehicle axles of iron or steel; annual capacity, 15,000 tons of open-hearth steel ingots, 9,000 tons of crucible steel ingots, and 23,000 tons of finished products. Fuel, coal, natural gas, and manufactured gas. Brand, "La Belle."

Pittsburgh Steel Works, McKees Rocks, Allegheny county, Pa., on the Pittsburgh and Lake Erie Railroad. Established in 1845; present works built in 1882–3; 15 heating furnaces, 3 trains of rolls, (20 and 16-inch and combined 10 and 12-inch,) and 8 hammers (60-lb. to 7-ton); two 33-pot crucible steel-melting furnaces with an annual capacity of 4,000 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 9,000 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, 6,000 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. A department for the manufacture of blacksmiths', miners', and other tools is connected with the works.

Sanderson Brothers Steel Works, Syracuse, Onondaga county, New York. Established in 1876; 14 heating furnaces, 4 annealing furnaces, 10 hammers, 4 trains of rolls, (one 16-inch sheet and one 9, one 10, and one 12-inch finishing,) and four 24 and four 12-pot Siemens crucible steel-melting furnaces with an annual capacity of 10,000 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, 7,000 tons. Fuel, coal. Brand, "Sanderson Bros. & Co."

Singer, Nimick & Co. Works, in the thirty-fourth ward, Pittsburgh, Pa. Built in 1848; 6 single puddling furnaces, 8 converting furnaces, 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; crucible steel works have an annual capacity of 13,200 tons of ingots; also operate an axle factory and a harrow disk 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, 14,800 tons. Fuel, natural gas, manufactured gas, and coal. (Equipped also with one idle 10-gross-ton acid open-hearth steel furnace.)

West Bergen Steel Works, Jersey City, Hudson county, New Jersey. Telegraph address, West Bergen. Built in 1880; 20 heating furnaces, 11 annealing furnaces, 8 trains of rolls, (5 hot and 3 cold,) cold-drawing plant with several blocks and one large draw bench, 7 hammers, one 48-pot gas and twenty-four 4-pot crucible steel-melting holes; product, crucible cast steel, bright drawn steel, and flat cold-rolled steel; also reroll nickel steel and Bessemer and open-hearth steel billets; annual capacity, single turn, 5,200 tons of crucible ingots, 8,000 tons of rolled products, and 2,000 tons of forged products. Fuel, coal. Brand for tool steel, the letter "J" in a diamond. (Formerly operated by the Spaulding and Jennings Company.)

Total annual capacity of the 11 works: open-hearth steel ingots, 166,000 gross tons; crucible and cemented steel ingots, 125,600 tons; and finished rolled and forged iron and steel products, 314,800 tons. Also about 2,000 tons of finished copper products.

IRON AND STEEL FORGING PLANTS—9.

Atha Steel Works, Harrison, New Jersey. Product, general forgings; annual capacity, 6,000 tons.

Black Diamond Steel Works, (operated by the Park Steel Company,) Pittsburgh, Pennsylvania. 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, Pennsylvania. Product, general forgings.

Howe, Brown & Co. Works, Penn ave. and Seventeenth st., Pittsburgh, Pennsylvania. Product, special forgings.

La Belle Steel Works, Ridge ave. and Rebecca st., Allegheny, Pennsylvania. Product, general forgings.

Pittsburgh Steel Works, McKees Rocks, Allegheny county, Pennsylvania. Product, general forgings; annual capacity, 3,000 tons.

Sanderson Brothers Steel Works, Syracuse, Onondaga county, New York. Product, general iron and steel forgings.

Singer, Nimick & Co. Works, in the thirty-fourth ward, Pittsburgh, Pennsylvania. Product, forged vehicle axles.

West Bergen Steel Works, Jersey City, Hudson county, New Jersey. Product, general forgings; annual capacity, 2,000 tons.

STANDARD CHAIN COMPANY.

Standard Chain Company; general offices, Bailey Farrell Building, Pittsburgh, Pa. *Officers at Pittsburgh:* John C. Schmidt, President; Robert Garland, Vice-President; J. T. Davis, General Manager; Arthur E. Crockett, Secretary; W. R. Dawson, General Sales Agent; and William Robertson, Treasurer. *Officer at St. Marys, Ohio:* Franz Krein, Assistant General Manager, Western District.

Capital stock, $3,000,000, of which $1,500,000 is preferred and $1,500,000 is common. The Standard Chain Company operates the following chain and forging works and rolling mill.

ROLLING MILLS—1.

Columbus Iron Works, Columbus, Franklin county, 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 rolled products.

IRON AND STEEL CHAIN AND FORGING WORKS—7.

Carlisle Chain Works, Gettysburg Junction, Cumberland county,

Pennsylvania. Product, coil, cable, trace, fancy, and other chains; sizes, from $\frac{1}{8}$ of an inch to $1\frac{1}{4}$ inches. Also make light forgings for railroad cars.

Krein Chain Works, Marion, Grant county, Indiana. Product, oil-welded, proof-tested coil, log, boom, dredge, and other chains; sizes, from $\frac{3}{16}$ of an inch to $1\frac{3}{4}$ inches. Also make light forgings for railroad cars.

Krein Chain Works, St. Marys, Auglaize county, 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, York county, Pennsylvania. 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, Franklin county, 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, Allegheny county, Pennsylvania. Product, coil, cable, wagon, conveyor, hand-made, and shackle chains; sizes, from $\frac{3}{16}$ of an inch to $2\frac{1}{4}$ inches. Also makes light forgings for railroad cars. The chain department and good will of the American Steel and Wire Company of Illinois, formerly operated as the H. P. Nail Works, at Cleveland, Ohio, and the Garland Chain Works, formerly operated by the Garland Chain Company, at Rankin Station, Pennsylvania, have been consolidated at the Standard Chain Company's plant at Braddock, Pennsylvania.

York Chain Works, York, York county, Pennsylvania. 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.

THE UNITED SHEET AND TIN PLATE COMPANY.

The United Sheet and Tin Plate Company; general offices, Marietta, Washington county, Ohio; branch offices, Newcomerstown, Tuscarawas county, Newark, Licking county, and Byesville, Guernsey county, Ohio. *Officer:* Cyrus Huling, Receiver, Columbus, Ohio. *Selling Agent:* American Tin and Terne Plate Company, 142–44 North Ninth st., Philadelphia.

Capital stock, $750,000, all common. The United Sheet and Tin Plate Company owns and operates the following works:

ROLLING MILLS AND STEEL WORKS—2 COMPLETED AND 1 PARTLY BUILT.

Byesville Works, Byesville, Guernsey county, Ohio. One 50-gross-ton Siemens basic open-hearth steel furnace partly erected in 1903 by the Cambridge-Byesville Steel Company; acquired by the United Sheet and Tin Plate Company in that year; work suspended; construction may be resumed in the spring or summer of 1904 and plant equipped for the manufacture of billets and sheet and tinplate bars. Fuel to be used, natural gas.

Marietta Works, Marietta, Washington county, 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 three 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. (Formerly operated by the Marietta Sheet and Tin Plate Company.)

Tuscora Works, Newcomerstown, 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. (Formerly operated by the Tuscora Steel Company; later by the Sheet Steel Company.)

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, Washington county, 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. Brand, "American M. S." Make black plates. (Formerly operated by the Marietta Sheet and Tin Plate Company.)

STAMPING WORKS.

Tucker Works, Newark, Licking county, Ohio. Product, eave troughs, conductor pipe, ridge rolls, and patent ceiling. (Formerly operated by the Tucker Steel Roofing Company.)

LA BELLE IRON WORKS.

La Belle Iron Works; general offices, Steubenville, Ohio; branch offices, Wheeling, W. Va. *Officers at Steubenville:* John A. Topping, President; A. J. Clarke, First Vice-President; E. W. Mudge, Second Vice-President and General Sales Manager; Isaac M. Scott, Secretary and Treasurer; and W. D. Crawford, General Manager.

Selling Agents: George A. Taylor Company, 170 Summer st., Boston, Mass.; A. Schroeder, 39 Cortlandt st., New York; R. M. Baily & Co., Arcade Building, Philadelphia; E. A. Henry, 1116 New England Building, Cleveland, Ohio, and Ellicott Square Building, Buffalo, N. Y.; C. R. Talbott Company, 9–10 Wiggins Block, Cincinnati, Ohio; H. L. Green & Co., Ogden Building, Chicago; H. C. McNair, St. Paul, Minn.; F. A. Goodrich Iron and Steel Company, Bank of Commerce Building, St. Louis, Mo.; Charles W. Pike & Co., 124 California st., San Francisco, Cal.; Lee Chamberlain & Co., 105 North Main st., Los Angeles, Cal.; J. R. Bowles, 209 Stark st., Portland, Oregon; John S. Worthington Company, Denver, Col.; A. Milne & Co., Boston, Mass.; Ely and Williams Company, 257 Broadway, New York; R. G. Campbell, 2011 Farmers Bank Building, Pittsburgh; and F. A. Goodrich & Co., Detroit, Mich.

Capital stock, $7,000,000. The company operates these works:

BLAST FURNACES—1 COMPLETED AND 1 BUILDING.

La Belle Furnaces, Steubenville, Jefferson county, Ohio. One completed stack and one stack building. Completed stack, No. 1, 90 x 20, originally built in 1865 and rebuilt in 1889; torn down and entirely rebuilt in 1901–3; pig iron first made at the rebuilt stack April 28, 1903; four Massicks & Crooke stoves, each 85 x 21; fuel, Connellsville coke; ore, Lake Superior; product, basic and foundry pig iron; annual capacity, 150,000 tons. Ground for the foundations for the building stack was broken in April, 1903; it will be known as No. 2, will be 90 x 20, and will be equipped with four Massicks & Crooke stoves, each 85 x 21; its annual capacity will be 150,000 tons of basic and foundry pig iron.—*Furnace No. 1 active in 1903.*

Total annual capacity of the completed furnace, 150,000 gross tons; of the building furnace, 150,000 tons: total, 300,000 tons.

ROLLING MILLS AND STEEL WORKS—2.

Steubenville Works, Steubenville, Jefferson county, Ohio. Originally built in 1855; purchased from the receiver of the Jeffer-

son Iron Works in 1899; old plant entirely dismantled and rebuilt in 1899–1903. Equipment now consists of one 24-inch continuous 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; nine 50-gross-ton basic open-hearth steel furnaces, with 16 soaking pits, built in 1901–2; first steel made July 26, 1902; and one 46-inch combined blooming and billet mill, built in 1901–2; first blooms made July 26, 1902. Fuel, natural gas, producer gas, and bituminous coal. (Cut-nail factory, containing 128 machines, abandoned in 1902.)

Wheeling Works, Wheeling, West Virginia. Built in 1852 and enlarged since; incorporated on December 3, 1875; 4 regenerative gas heating furnaces, one 3-high 22-inch nail-plate and one 2-high 21-inch nail-plate or skelp mill, and 173 cut-nail machines. Fuel, natural gas.

Product of the 2 works: open-hearth steel ingots and slabs, universal plates, flat bars and skelp, specialty plates, and cut nails.

Total annual capacity: 300,000 gross tons of basic open-hearth steel ingots and slabs, 120,000 tons of universal plates, 180,000 tons of flat bars and skelp, 60,000 tons of specialty plates, and 300,000 kegs of cut nails. Brand, "La Belle."

CUT-NAIL WORKS, WROUGHT-STEEL PIPE WORKS, ETC.

Wheeling Works, Wheeling, West Virginia. Number of cut-nail machines, 173; sizes, from ¾ of an inch to 8 inches; annual capacity, 300,000 kegs of iron and steel cut nails.

Steubenville Works, Steubenville, Ohio. Product, steel lap and butt welded pipe; sizes, from ⅛ of an inch to 12 inches; annual capacity, 100,000 tons.

Steubenville Works, Steubenville, Ohio. Product, gray iron and open-hearth steel general mill castings; annual capacity, 7,500 tons.

A galvanizing department is connected with the Steubenville Works. Product, galvanized pipe; annual capacity, 12,000 tons.

IRON-ORE AND COAL MINES, COKE OVENS, ETC.

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 operate 56 bee-hive coke ovens in Fayette county, Pa., with an annual capacity of 40,000 tons. In addition 144 ovens are in course of erection. They also own 99 acres of undeveloped limestone property in Berkeley county, W. Va.

WHEELING STEEL AND IRON COMPANY.

Wheeling Steel and Iron Company; general offices, Wheeling, Ohio county, West Virginia. *Officers:* C. R. Hubbard, President; Frank W. Bowers, Secretary; W. H. Higgins, Assistant Secretary and Treasurer; and H. G. Tinker, General Sales Agent.

Capital stock, $5,000,000, of which $4,213,600 was issued on January 1, 1904. The company operates the following works:

BLAST FURNACES—2 COMPLETED AND 1 REBUILDING.

Belmont Furnace, Wheeling, West Virginia. 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 pig iron; annual capacity, 75,000 tons. Brand, "Belmont."—*Active in 1903.*

Martins Ferry Furnace, Martins Ferry, Belmont county, Ohio. One stack, originally built in 1866; old stack torn down in 1903 and an entirely new stack, to be 80 x 18, now being built on the site of the old furnace; will probably be ready for blast late in 1904; three Massicks & Crooke stoves, each 75 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; estimated annual capacity, 100,000 tons. Brand, "Martins Ferry." —*Active in 1903. Rebuilding; to be ready for blast late in 1904.*

Top Mill Furnace, Wheeling, West Virginia. 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."—*Active in 1903.*

Total annual capacity of the 3 furnaces: 275,000 gross tons.

ROLLING MILLS AND STEEL WORKS—4.

Belmont Works, Wheeling, West Virginia. 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 two-high 22-inch, and one continuous 22-inch,) and 50 cut-nail machines; product, grooved skelp and nails made from soft steel slabs; 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, Marshall county, West Virginia. 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 iron and steel

skelp; annual capacity, 21,000 tons of muck bar and 45,000 tons of skelp. Fuel, bituminous coal.

Top Mill, Wheeling, West Virginia. 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, West Virginia. 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: Bessemer steel ingots, 190,000 gross tons; nail slabs, blooms, and billets, 180,000 tons; skelp and sheets, 173,000 tons; muck bar, 21,000 tons; and cut nails and cut spikes, 420,000 kegs.

CUT-NAIL AND CUT-SPIKE WORKS—2.

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, 13,000 kegs of 100 lbs.; railroad spikes not made.

IRON FOUNDRY AND TUBE MILL.

Belmont Foundry, Wheeling, West Virginia. Product, general mill castings of gray iron; annual capacity, 1,200 tons.

Benwood Tube Works, Benwood, West Virginia. Built in 1902; product, wrought iron and steel tubes; sizes, from ⅛ of an inch to 16 inches; annual capacity, 75,000 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 land in Fayette county, Pa.

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.

Capital stock authorized, $3,000,000, all common, of which $2,000,000 has been paid in. The company operates the following works:

ROLLING MILLS—2.

Crescent Iron Works, (Whitaker Department,) Wheeling, West Virginia. 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 18 trains of rolls (one 18-inch muck, one 18-inch bar, four 22 and three 26-inch sheet, and two 22 and two 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." (Formerly operated by the Whitaker Iron Company.)

Laughlin Department, Martins Ferry, Belmont county, 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; 3 regenerative gas heating furnaces, one train of plate rolls, and 225 cut-nail machines; product, steel cut nails and cut spikes; annual capacity, 625,000 kegs of cut nails and cut spikes. 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 manufactured gas. Brand, "Laughlin." Shovel, galvanizing, corrugating, and metal-ceiling departments are connected with the works. (Formerly operated by the Laughlin Nail Company.)

Total annual capacity of the 2 rolling mills: 50,000 tons of sheets and black plates and 625,000 kegs of cut nails and cut spikes.

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. Brands: for charcoal plates, "Ft. Henry," "Ewing," and "Wheeling;" for coke plates, "Thayer;" for terne plates, "Whitaker," "Eleanor," "Margaret," "Nelson," "Wylie," "Helen," "Pauline," "Dorcas," "Nina," and "Klea." 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.

CUT-NAIL AND CUT-SPIKE WORKS.

Laughlin Department, Martins Ferry, Belmont county, Ohio. Sizes of cut nails, from ¾ of an inch to 6 inches; of cut spikes, from 4 inches to 8 inches; number of cut-nail machines, 225; annual capacity, 625,000 kegs of steel nails and spikes.

GALVANIZING PLANTS—2.

Laughlin Department, Martins Ferry, Ohio. Number of galvanizing pots, 3; product, galvanized iron and steel sheets; annual capacity, 15,000 tons. Also makes painted and galvanized roofing sheets, conductor pipes, eave troughs, etc.

Wheeling Corrugating Company, Wheeling, West Virginia. (Controlling interest owned by the Whitaker-Glessner Company.) Number of galvanizing pots, 4; product, galvanized sheets, galvanized and painted roofing, galvanized and tinned shingles, etc. Also makes conductor pipes, eave troughs, tin roofings, valleys and gutters, nested stove pipes, etc.

METAL-CEILING WORKS—2.

Laughlin Department, Martins Ferry, Ohio. Product, steel embossed ceiling and sidewalls; annual capacity, 500 tons.

Wheeling Corrugating Company, Wheeling, Ohio county, West Virginia. Product, steel embossed ceilings.

SHOVEL WORKS.

Laughlin Department, Martins Ferry, Ohio. Product, all styles, grades, and sizes of hollow back, plain back, and back strap riveted shovels; annual capacity, 100,000 dozen.

THE WELLMAN-SEAVER-MORGAN COMPANY.

The Wellman-Seaver-Morgan Company; general offices, Central ave., corner of Giddings ave., Cleveland, Ohio; branch offices, 515 Frick Building, Pittsburgh; Maritime Building, New York; and 47 Victoria st., Westminster, London, England. *Officers at Cleveland:* S. T. Wellman, President; John W. Seaver, Chairman; S. H. Pit-

kin, First Vice-President; T. R. Morgan, Second Vice-President and Manager of Works; G. H. Hulett, Third Vice-President; C. H. Wellman, General Manager; and A. D. Hatfield, Secretary and Treasurer.

This company was formed by the consolidation in April, 1903, of the Wellman-Seaver-Morgan Engineering Company, of Cleveland, Ohio, and the Webster, Camp, and Lane Company, of Akron, Ohio.

Capital stock, $3,000,000, of which $1,000,000 is 7 per cent. cumulative preferred and $2,000,000 is common. The Wellman-Seaver-Morgan Company operates the following works:

STEEL-CASTING WORKS—1.

Steel Casting Department of the Wellman-Seaver-Morgan Company, Cleveland, Ohio. Built in 1902–3; one 20-gross-ton basic open-hearth furnace; first steel made January 29, 1903; product, steel castings for all purposes; annual capacity, 6,000 tons. Fuel, natural gas and oil.

Total annual capacity of steel castings: 6,000 gross tons.

SPECIAL MACHINERY WORKS—2.

Akron Works, Akron, Ohio. Product, mining and hoisting machinery, Hulett patented ore handling apparatus, turbine water wheels, Corliss engines, etc. (Formerly operated by the Webster, Camp, and Lane Company.)

Cleveland Works, Central and Giddings aves., Cleveland, Ohio. Product, machinery for iron and steel works, Wellman patented charging apparatus, electric cranes, mechanical gas producers, Forter water sealed valves, coke oven machinery, ore handling machinery, etc. (Formerly operated by the Wellman-Seaver-Morgan Engineering Company.)

RAILWAY STEEL-SPRING COMPANY.

Railway Steel-Spring Company; general offices, 71 Broadway, New York. *Officers:* Julius E. French, President; Charles Scott, Jr., and W. H. Silverthorn, Vice-Presidents; M. B. Parker, Secretary; James C. Beach, Treasurer; and Frank Carnahan, Assistant Treasurer.

Capital stock, $27,000,000, of which $13,500,000 is 7 per cent. cumulative preferred and $13,500,000 is common. The Railway Steel-Spring Company operates the following plants:

ROLLING MILLS—1.

Detroit Works, Steel Department, Michigan and Hubbard avenues,

Detroit, Wayne county, Michigan. 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. (Formerly operated by the Detroit Steel and Spring Company. The Robert-Bessemer converters, formerly operated by the Detroit Steel and Spring Company, are now owned and operated by the Detroit Steel Casting Company.)

Annual capacity of rolled steel products: 40,000 gross tons.

STEEL SPRING WORKS—5.

Detroit Works, Spring Department, Michigan and Hubbard aves., Detroit, Michigan. Product, coil springs for passenger and freight equipment; annual capacity, 30,000 tons. (Formerly operated by the Detroit Steel and Spring Company.)

French Works, Spring Department, Liberty ave. and Twentieth st., Pittsburgh, Pa. Product, elliptical and coil springs for locomotive, passenger, and freight equipment; also machinery springs, etc.; annual capacity, 24,000 tons. (Formerly operated by the A. French Spring Company.)

National Works, Spring Department, Oswego, New York. Product, elliptical and coil springs for locomotive, passenger, and freight equipment; annual capacity, 10,000 tons. (Formerly operated by the National Railway Spring Company.)

Pickering Works, Spring Department, Eighteenth st. and Pennsylvania ave., Philadelphia, Pa. Product, elliptical and coil springs for locomotive, passenger, and freight equipment; also machinery springs, etc.; annual capacity, 12,000 tons. (Formerly operated by the Pickering Spring Company, Limited.)

Scott Works, Spring Department, Germantown ave. and New Market st., Philadelphia, Pa. Product, elliptical and coil springs for locomotive, passenger, and freight equipment; also machinery springs, etc.; annual capacity, 15,000 tons. (Formerly operated by the Charles Scott Spring Company.)

Total annual capacity of the 5 works: 91,000 gross tons of springs.

STEEL-TIRED WHEEL AND OTHER WORKS—6.

Chicago Works, Steel-Tired Wheel Department, Chicago, Illinois. Steel-tired wheels are turned and fitted to axles at these works, but no wheels are made. (Formerly operated by the Steel-Tired Wheel Company.)

Denver Works, Steel-Tired Wheel Department, Denver, Colorado. Product, steel-tired engine, tender, and coach wheels; annual capacity, 7,000 wheels. (Formerly operated by the Steel-Tired Wheel Company.)

Depew Works, Steel-Tired Wheel Department, Depew, New York. Product, steel-tired engine, tender, coach, and motor wheels; annual capacity, about 12,000 wheels. (Formerly operated by the Steel-Tired Wheel Company.)

Hudson Works, Steel-Tired Wheel Department, Hudson, New York. Product, steel-tired engine, tender, coach, and motor wheels; annual capacity, about 15,000 wheels. (Formerly operated by the Steel-Tired Wheel Company.)

Pullman Works, Steel-Tired Wheel Department, Pullman, Illinois. Product, steel-tired engine, tender, coach, and motor wheels; annual capacity, about 16,000 wheels. (Formerly operated by the Steel-Tired Wheel Company.)

Scranton Works, Steel-Tired Wheel Department, Scranton, Pa. Product, steel-tired engine, truck, tender, and coach wheels; annual capacity, about 10,000 wheels. (Formerly operated by the Steel-Tired Wheel Company.)

Annual capacity of the 6 works: about 60,000 steel-tired wheels.

INTERNATIONAL HARVESTER COMPANY.

International Harvester Company; general offices, No. 7 Monroe st., Chicago. *Officers:* Cyrus H. McCormick, President; Harold F. McCormick, W. H. Jones, James Deering, and J. J. Glessner, Vice-Presidents; R. F. Howe, Secretary and Treasurer; Charles Deering, Chairman of Executive Committee; George W. Perkins, Chairman of Board of Directors; W. M. Reay, Acting Comptroller; Cyrus Bentley, General Counsel; A. E. Mayer, General Manager of Sales; E. A. S. Clarke, General Manager of Manufacturing Department; H. F. Perkins, General Manager of Purchasing Department; G. F. Steele, General Manager of Collection Department; R. B. Swift, General Manager of Experimental Department; J. F. Steward, General Manager of Patent Department; O. W. Jones, General Manager of Traffic Department; and C. S. Funk, General Manager of Securities Department.

Capital stock, $120,000,000, all common. The International Harvester Company operates or controls the following works:

BLAST FURNACES—2.

South Chicago Furnaces, South Chicago Furnace Company, Rookery Building, Chicago. Furnaces at South Chicago. Two stacks: No. 1, 78 x 16, built in 1880 and blown in in 1881; rebuilt in 1899 and 1902; one Massicks & Crooke and three Foote stoves.

No. 2, 80 x 19, built in 1902–3 and blown in August 7, 1903; four Kennedy stoves, each 22 x 85. Fuel, Connellsville and Virginia coke; ores, 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 of the International Harvester Company at South Chicago. W. L. Brown, President; R. F. Howe, Vice-President; A. F. Maynard, Secretary and Treasurer. Selling agents, Pickands, Brown & Co., Chicago. (All the stock of the South Chicago Furnace Company, amounting to $300,000, is owned by the International Harvester Company.)—*Active in 1903.*

Total annual capacity of the 2 furnaces: 200,000 gross tons.

ROLLING MILLS AND STEEL WORKS—2.

Deering Mills, (Deering Division,) Fullerton and Clybourn avenues, Chicago. Built in 1901 and first put in operation October 10, 1901; 2 Sweet heating furnaces and one train of 13-inch rolls with five stands; product, merchant flats, rounds, angles, channels, and ovals rolled from old steel rails and billets; annual capacity, 18,000 tons. Brand, "Deering." Fuel, bituminous coal.

South Chicago Works, South Chicago, (Station S,) Illinois. Built in 1902–3 and bar mills 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, 2 cupolas, 6 gas-fired soaking pits, 2 continuous heating furnaces, one 2-high 35-inch reversing blooming train, (with rolls 68 inches long,) and one Morgan continuous finishing mill, (with eight stands of 14-inch roughing and four stands of 11-inch and two stands of 8-inch finishing rolls); product, blooms, slabs, billets, merchant bars, agricultural shapes, etc.; annual capacity, from 150,000 to 200,000 tons of slabs and billets and 60,000 tons of bars and shapes. Fuel, bituminous coal. Open-hearth furnaces may be added.

Total annual capacity of the 2 rolling mills and steel works: 500,000 gross tons of Bessemer steel ingots, from 150,000 to 200,000 tons of slabs and billets, and 78,000 tons of bars and shapes.

MALLEABLE IRON WORKS, HARVESTING MACHINERY, ETC.

Champion Works, Springfield, Clark county, Ohio. Number of annealing furnaces, 38; product, malleable agricultural castings, all consumed by the company in the manufacture of harvesters, mowers, binders, etc.; daily capacity, 25 tons. (Formerly operated by the Warder, Bushnell, and Glessner Company.)

Deering Works, 16 Fullerton avenue, Chicago. Works on Clybourn avenue near Wrightwood avenue. Number of annealing furnaces, 23; product, agricultural implement castings, all consumed by the company in the manufacture of harvesting machinery; daily capacity, 95 tons. (Formerly operated by the Deering Harvester Company.)

McCormick Works, Blue Island and Western avenues, Chicago. Number of annealing furnaces, 24; product, malleable agricultural castings for the use of the works; daily capacity, 17 tons. (Formerly operated by the McCormick Harvesting Machine Company.)

IRON AND BRASS FOUNDRIES.

The International Harvester Company also operates foundries which produce iron and brass agricultural castings at the Champion Works, at Springfield, Ohio; the Deering, McCormick, and Plano Works, at Chicago; and the Milwaukee Works, at Milwaukee, Wisconsin. These works are also equipped for the manufacture of grain harvesting and corn harvesting machinery, corn shockers, reapers, mowers, rakes, seeders, cultivators, and harrows.

IRON-ORE LANDS.

The company also owns or controls about 500 acres of iron-ore lands in Minnesota, Wisconsin, and Michigan, including the Agnew and Hawkins mines, in the Mesabi Range, in Minnesota; the Illinois Iron Mining Company, at North Freedom, Wisconsin, in the Baraboo Range; and the Victoria and Lot 3 mines at Crystal Falls, Michigan. The capacity of these mines is about 400,000 tons of iron ore annually.

SAW MILLS AND COAL AND TIMBER LANDS.

At Deering, Missouri, and at Mosher, Arkansas, the company operates band saw mills, each of which has a daily capacity of 30,000 feet of sawed lumber.

The company also owns about 23,000 acres of undeveloped coal lands in Harlan county, Kentucky. It also owns about 60,000 acres of timber lands in Pemiscot and Dunklin counties, Missouri.

CANADIAN WORKS.

The company has just completed a plant at Hamilton, Ontario, Canada, which it operates under the name of the International Harvester Company of Canada, Limited. 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 agricultural machinery. The malleable foundry has a daily capacity of about 25 net tons.

AMERICAN BRAKE SHOE AND FOUNDRY COMPANY.

American Brake Shoe and Foundry Company; general offices, Mahwah, Bergen county, New Jersey. Branch offices, 170 Broadway, New York, and Western Union Building, Chicago. *Officers:* W. W. Snow, Chairman of the Board of Directors; Otis H. Cutler, President; J. D. Gallagher, First Vice-President; Joseph B. Terbell, Second Vice-President; and Henry C. Knox, Secretary and Treasurer.

Capital stock, $4,500,000, of which $3,000,000 is 7 per cent. cumulative preferred and $1,500,000 is common. The company owns or controls the following works, which are equipped for the manufacture of brake shoes, Tropenas steel castings, crucible steel inserts, gray iron castings, etc. Brake shoes are also manufactured under license by the Griffin Wheel Company at Chicago, Detroit, Denver, and Tacoma; by the St. Louis Car Wheel Company at St. Louis; by the Decatur Car Wheel and Manufacturing Company at Birmingham, Alabama; and by the Atlanta Car Wheel and Manufacturing Company at Atlanta, Georgia.

IRON AND STEEL FOUNDRIES—6.

Bloomfield Works, Bloomfield, Essex county, New Jersey. Product, gray iron and patented brake shoes and miscellaneous castings; annual capacity, 15,000 tons.

Buffalo Works, Buffalo, Erie county, New York. Product, gray iron and patented brake shoes; annual capacity, 15,000 tons.

Chattanooga Works, Chattanooga, Hamilton county, Tenn. Product, gray iron and patented brake shoes; annual capacity, 9,000 tons.

Chicago Heights Works, Chicago Heights, Cook county, Illinois. Built in 1899–1900; three 2-gross-ton Tropenas steel converters; first steel made April 2, 1900; product, brake shoes and miscellaneous steel castings; annual capacity, 8,000 tons. Crucible steel department added in 1901 and first crucible steel made February 4, 1901; one 5-hole crucible steel-melting furnace; number of pots, 60; product, crucible cast-steel inserts for brake shoes; annual capacity, 500 tons. Fuel, coke. A gray iron foundry is connected with the works; product, brake shoes and miscellaneous castings; annual capacity, 18,000 tons. (Formerly operated by the Sargent Company.)

Corning Works, Corning, Steuben county, New York. Product, miscellaneous castings and oil boxes; annual capacity, 15,000 tons.

Mahwah Works, Mahwah, Bergen county, New Jersey. Product,

gray iron and patented brake shoes and miscellaneous castings; annual capacity, 27,000 tons.

Total annual capacity of the 6 works: 8,000 gross tons of Tropenas steel castings, 500 tons of crucible steel inserts, and 99,000 tons of gray iron and patented brake shoes and castings.

INLAND STEEL COMPANY.

Inland Steel Company; general offices, First National Bank Building, Chicago. *Officers:* G. H. Jones, President; L. E. Block, Vice-President; P. D. Block, Vice-President and Treasurer; R. J. Beatty, Vice-President and General Manager; and A. S. Hook, Secretary.

Sales Offices and Agents: Davis, Kelly & Co., Louisville, Ky.; John H. Heimbuecher, St. Louis, Mo.; F. A. Goodrich & Co., Detroit, Mich.; B. B. Czapski, St. Paul, Minn.; W. S. Weyer, Kansas City, Mo.; and the John S. Worthington Company, Denver, Colorado.

Capital stock, $2,500,000, all common. The Inland Steel Company operates the following rolling mills and steel works:

ROLLING MILLS AND STEEL WORKS—2.

Chicago Heights Works, Chicago Heights, Cook county, Ill. 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 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, Lake county, Indiana. Built in 1901–2; first steel made July 21, 1902; first rolled products made November 1, 1902; four 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); product, ingots, billets, slabs, sheets, light plates, angles, I beams, channels, shafting, and merchant bars; annual capacity, 125,000 tons of ingots, 35,000 tons of sheets, and 75,000 tons of bars. Fuel, coal and manufactured gas.

Total annual capacity: 125,000 gross tons of ingots, 35,000 tons of sheets, 75,000 tons of merchant bars, 30,000 tons of bar steel, 1,500 tons of harrow teeth, and 100,000 steel plow beams.

AMERICAN CAR AND FOUNDRY COMPANY.

American Car and Foundry Company; general offices, Lincoln Trust Building, St. Louis, Mo.; Eastern offices, Broad Exchange Building, New York City. *Officers at St. Louis:* W. K. Bixby, Chairman of the Board; W. J. McBride, First Vice-President and General Manager; D. A. Bixby, Secretary; S. S. DeLano, Treasurer; and J. M. Buick, Auditor. *Officer at Chicago:* E. F. Carry, Second Vice-President and District Manager, Railway Exchange Building. *Officer at Detroit:* George Hargreaves, Fourth Vice-President and District Manager. *Officer at New York:* Frederick H. Eaton, President. *District Managers:* Berwick, Pa., W. F. Lowry; Chicago, Illinois, E. F. Carry, Railway Exchange Building; Huntington, W. Va., John W. Ensign; Jeffersonville, Indiana, J. D. Ingram; Milton, Pa., C. L. Rogers; St. Charles, Missouri, J. G. Lawler; Detroit, Michigan, George Hargreaves; Madison, Illinois, and St. Louis, Missouri, Frederick F. Bixby, Lincoln Trust Building, St. Louis, Missouri. *Resident Representatives:* Buffalo and Depew, N. Y., W. H. Sanford, Buffalo; 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, Columbia county, 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, 35,000 tons. Fuel, bituminous coal. Brand, "Berwick." Also build cars and manufacture car wheels, forgings, and cast-iron gas and water pipe.

Michigan-Peninsular Works, Detroit, Wayne county, Mich. 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, 38,000 tons of bar iron and 45,000 car axles. 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 large carbuilding shops are connected with these works.

Wells and French Works, Paulina and Blue Island aves., Chicago, Illinois. Special train of rolls added to car-wheel and carbuilding works in 1902; first rolled steel car wheels made in July, 1902; one heating furnace and one train of rolls; product, rolled steel railroad and street car wheels made from cast-steel disks; annual capacity, 10,000 rolled wheels. Fuel, bituminous coal. Also make chilled cast-iron car wheels, build cars, etc.

Total annual capacity: 73,000 gross tons of rolled bar iron, 45,000 car axles, and 10,000 rolled railroad and street car wheels.

IRON AND STEEL CAR-AXLE WORKS—3.

Ensign Works, Huntington, West Virginia. Product, hammered car axles from wrought scrap iron; annual capacity, 20,000 axles.

Jackson and Woodin Works, Berwick, Pa. Product, straight-rolled iron and steel car axles; annual capacity, 10,000 axles.

Michigan-Peninsular Works, Detroit, Michigan. Product, iron and steel car axles; annual capacity, 45,000 axles.

Total annual capacity of the 3 works: 75,000 car axles.

12 CAR-WHEEL WORKS AND 1 BRASS AND 13 IRON FOUNDRIES.

Ensign Works, Huntington, West Virginia. 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, 4,000 tons.

Jackson and Woodin Works, Berwick, Pennsylvania. Product, freight and mine car wheels; annual capacity, 100,000 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, 150,000 wheels. Also make railroad and other gray iron and malleable castings for cars; annual capacity, 6,000 tons of gray iron castings.

Michigan-Peninsular Works, Detroit, Michigan. Two car-wheel plants. Product, chilled cast-iron car wheels; total annual capacity, 210,000 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, Mo. Product, chilled cast-iron wheels for locomotive, passenger, freight, motor, mine, ore, logging, truck, and cable cars; annual capacity, 200,000

wheels. Also make railroad and other gray iron castings; annual capacity, 17,500 tons.

Niagara Car Wheel Works, Buffalo, New York. Product, chilled cast-iron wheels for steam, electric, and street cars; annual capacity, 100,000 wheels.

Ohio Falls Works, Jeffersonville, Indiana. Product, all kinds of cast-iron car wheels; annual capacity, 75,000 wheels. Also make railroad and other gray iron castings; annual capacity, 10,000 tons.

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.

Union Works, Depew, New York. Product, chilled cast-iron car wheels; annual capacity, 100,000 wheels. Also make railroad and other gray iron castings; annual capacity, 6,000 tons.

Wells and French Works, Paulina and Blue Island avenues, Chicago, Illinois. Product, all kinds of chilled cast-iron car wheels and rolled steel railroad and street car wheels; annual capacity, 130,000 chilled and 10,000 rolled wheels. Also make railroad and other gray iron castings; annual capacity, 10,000 tons.

Total annual capacity of the 12 car-wheel works: 1,393,000 wheels; of the 13 gray iron foundries, 122,000 gross tons of castings; and of the single brass foundry, 75 tons of castings.

CAST-IRON PIPE WORKS—2.

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, Michigan. Product, cast-iron gas and water pipe; sizes of pipe, from 4 to 42 inches; daily melting capacity, 40 tons.

Total daily melting capacity of the 2 works: 90 gross tons.

CARBUILDING WORKS—14.

Buffalo Car Works, Buffalo, New York. Product, all kinds of wooden freight cars; annual capacity, 5,000 cars.

Ensign Works, Huntington, West Virginia. Product, wooden and steel underframe freight cars; annual capacity, 9,000 cars.

Indianapolis Works, West Indianapolis, Indiana. Product, all kinds of freight cars; annual capacity, 4,500 cars.

Jackson and Sharp Works, Wilmington, Delaware. Product, all

kinds of sleeping, parlor, express, mail, baggage, electric, street, and cable cars; build cars with steel underframes; 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, freight, mine, and construction cars of wood or of structural and pressed steel; annual capacity, 15,000 cars.

Madison Car Works, Madison, Illinois. Product, iron, steel, and wooden freight, caboose, horse, beer, refrigerator, ore, dump, construction, show, hay, furniture, tank, clay, sand, stock, logging, mining, cane, and other cars; annual capacity, 12,000 cars.

Michigan-Peninsular Works, Detroit, Michigan. Product, all kinds of wooden freight and refrigerator cars; annual capacity, 30,000 cars. Also structural and pressed steel cars; annual capacity, 15,000 cars.

Milton Car Works, Milton, Pa. Product, all kinds of freight and tank cars; annual capacity, 4,500 cars.

Missouri Car and Foundry Works, St. Louis, Missouri. Product, iron, steel, and wooden freight, fruit, flat, box, circus, furniture, coal, hay, beer, caboose, stock, refrigerator, mine, ore, tank, logging, dump, horse, and other cars; annual capacity, 15,000 cars.

Ohio Falls Works, Jeffersonville, Indiana. Product, freight, passenger, parlor, sleeping, and other cars; annual capacity, 6,000 freight and 300 passenger cars.

St. Charles Works, St. Charles, Missouri. Product, iron, steel, and wooden passenger and freight cars of every description; annual capacity, 7,000 freight and 300 passenger cars.

Terre Haute Works, Terre Haute, Indiana. Product, all kinds of freight cars; annual capacity, 9,000 cars.

Union Works, Depew, New York. Product, wooden freight cars of all kinds; annual capacity, 10,000 cars.

Wells and French Works, Chicago, Illinois. Product, wooden freight and refrigerator cars; annual capacity, 12,000 cars.

Total annual capacity of the 14 carbuilding works: 900 passenger and 154,150 freight, street, and other cars, including structural and pressed steel cars and cars with steel underframes.

MALLEABLE IRON WORKS—2.

Madison Car Works, Madison, Illinois. Eight annealing furnaces; product, malleable castings for cars; daily capacity, 10 tons.

St. Charles Works, St. Charles, Missouri. Ten annealing furnaces; product, malleable castings for cars; daily capacity, 10 tons.

IRON AND STEEL BOLT, NUT, AND FORGING WORKS—14.

Buffalo Car Works, Buffalo, New York. Product, bolts from ⅜ 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, West Virginia. Product, bolts from ⅜ 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 ⅜ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 1,000 tons.

Jackson and Sharp Works, Wilmington, Delaware. Product, bolts from ⅜ 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 ⅜ of an inch to 2 inches; square nuts, from ½ of an inch to 1⅛ inches; and hexagon nuts, from ¾ to ⅞ 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 ⅜ of an inch to 2 inches and light railroad forgings; annual capacity of forgings not for the use of the company, 2,000 tons.

Michigan-Peninsular Works, Detroit, Michigan. Product, bolts from ⅜ 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 ⅜ 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, Missouri. Product, bolts from ⅜ 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 ⅜ 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 ⅜ 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 ⅜ 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, New York. Product, bolts.—*Idle.*

Wells and French Works, Chicago, Illinois. Product, bolts from ⅜ 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: 25,300 gross tons.

NATIONAL ENAMELING AND STAMPING COMPANY.

National Enameling and Stamping Company; executive offices, 81–83 Fulton st., New York. Salesrooms and warehouses: New York, 78–80 Beekman st.; Chicago, cor. Canal and Fulton sts.; St. Louis, Cass ave.; Milwaukee, St. Paul ave.; Baltimore, Ohio ave. and Light st.; and New Orleans, 627–29 Magazine st. *Officers:* F. G. Niedringhaus, President, St. Louis; Ferdinand A. W. Kieckhefer, First Vice-President, Milwaukee, Wis.; Frederick Haberman, Second Vice-President, New York; James E. Ingram, Treasurer, William H. Matthai, Secretary, and George W. Knapp, Director General of Works, Baltimore, Md.; and A. M. Steinhardt, Assistant Secretary and Assistant Treasurer, New York.

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 following works:

ROLLING MILLS AND STEEL WORKS—2.

Granite City Rolling Mills, Granite City, Madison county, Ill. Built in 1895 and enlarged in 1899–1900; company declines to give a detailed description of the equipment of these works for the Directory; 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.

St. Louis Rolling Mills, Second and Destrehan sts., St. Louis, Missouri. Built in 1879 and enlarged in 1900; company declines to give a detailed description of the equipment of these works for the Directory; 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.

TINPLATE AND TERNE PLATE WORKS—2.

Baltimore Branch, Ohio ave. and Light st., Baltimore, Maryland. Built in 1892 and first tinplates made in April, 1892; 5 sets; weekly capacity, 950 boxes of tinplates of 108 pounds. Fuel, coal.

St. Louis Tinplate Works, Second and Destrehan sts., St. Louis, Missouri. Tinning plant added to rolling mill in 1890; first tin-

plates made in November, 1890, and first terne plates in March, 1891; 14 sets; weekly capacity, 4,800 boxes of tin and terne plates of 108 pounds. Fuel, coal. Brands: for tinplates, "Granite" and "St. Louis" for charcoal and "Steel Coke" for coke; for terne plates, "Acme Old Method," "Alta," "Ex. Fine," and "S. L. S. Old Process."

Total weekly capacity of the tin and terne plate works: 5,750 boxes.

STAMPING AND ENAMELING WORKS—8.

Baltimore Branches, Baltimore, Maryland. Two plants: Matthai, Ingram & Co. Branch, Ohio ave. and Light st.; product, enameled, 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, New York. 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, La. Product, plain, retinned, and pieced tinware and japanned and galvanized ware. Also sells enameled ware of affiliated branches.

Whittaker and Weber Branch, St. Louis, Missouri. Product, stamped and galvanized ware. (Formerly operated by the Whittaker and Weber Manufacturing Company.)

GRAY IRON FOUNDRY.

Granite City Foundry, Granite City, Illinois. Product, gray iron castings for the company's use; annual capacity, 1,500 tons.

THE COLORADO FUEL AND IRON COMPANY.

The Colorado Fuel and Iron Company; general offices, Boston Building, Denver, Colorado; sales offices, Denver, Colorado; El Paso, Texas; Los Angeles and San Francisco, California; and Salt Lake City, Utah. *Officers at Denver:* F. J. Hearne, Chairman Board of Directors and President; R. M. Waite, Assistant to President; J. F. Welborn, Vice-President and General Manager of Sales; D. C. Beaman, Secretary and General Counsel; Albert A. Miller, Assistant Treasurer; A. D. Moss, Assistant Treasurer; Cass E. Her-

rington, General Attorney Land Department; Fred Herrington, General Attorney Operating Department; C. A. Parker, Traffic Manager; John T. Kebler, General Manager Fuel Department; J. A. Writer, Auditor; and S. G. Pierson, Purchasing Agent. *Officers at New York:* E. Parmalee Prentice, Vice-President, 35 Wall street, and E. V. Cary, Assistant Secretary and Transfer Agent, 26 Broadway. *Officers at Pueblo:* C. S. Robinson, General Manager Iron Department, and J. B. McKennan, General Superintendent Minnequa Works. Capital stock authorized, $40,000,000. The company operates or controls the following works:

BLAST FURNACES—5 COMPLETED AND 1 BUILDING.

Minnequa Furnaces, Pueblo, Pueblo county, Colorado. Five completed stacks and one stack building: Furnace A, 95 x 20, built in 1900–1 and blown in September 4, 1901; Furnace B, 75 x 17½, built in 1890–1 and remodeled, capacity increased, and new stove added in 1901; Furnace C, 75 x 17, built in 1880–1, blown in September 7, 1881, and rebuilt and modernized in 1893; Furnace D, 95 x 20, built in 1901–2 and blown in November 20, 1902; and Furnace E, 90 x 20, built in 1901–2 and blown in May 30, 1903. Furnace F, 85 x 20, started in 1902; not completed. Twenty-five Siemens-Cowper stoves and one Heyl & Patterson and 4 Henry Aiken pig-iron casting machines. Fuel, coke, made at the company's ovens at Sopris, El Moro, Starkville, Tercio, Segundo, and Tabasco; ores, limonite, hematite, and magnetite from the company's mines in Colorado, Wyoming, and New Mexico; product, Bessemer, foundry, Scotch, and mill pig iron, and spiegeleisen; total annual capacity, 500,000 tons. Furnace F when completed will increase this capacity 125,000 tons. Molten metal is conveyed to storage tanks connected with the Bessemer converters in the Minnequa Steel Works.

Total annual capacity of the 5 completed furnaces, 500,000 gross tons; of the building furnace, 125,000 tons: total, 625,000 tons.

ROLLING MILLS AND STEEL WORKS—2.

Minnequa Rolling Mills and Steel Works, Pueblo. Built in 1881–2 and extensive improvements made in 1889, 1891, 1893, and 1901–3. The Bessemer converting department made its first blow April 11, 1882; new Bessemer converting department built in 1901–2 to replace old plant, which was dismantled in December, 1902; plant now consists of two 15-gross-ton converters with an annual capacity of 600,000 tons of ingots, 3 pig iron and 3 spiegel melting cupolas, one manganese furnace, and two 200-ton Henry Aiken storage tanks, hot metal being conveyed direct from the Minnequa Furnaces to the storage tanks.

The rail mill department was built in 1881–2 and extensive improvements made in 1896; other improvements and enlargements of this department were started in 1902 and are not yet completed; present plant contains four 4-hole soaking pits, two 12-ingot soaking pits, and 2 Siemens bloom heating furnaces, all gas-fired, and 3 hot trains of rolls (one 36-inch reversing blooming, one 28-inch roughing, and one 3-high 26-inch finishing); present annual capacity, 300,000 tons of steel rails.

The merchant department contains one 12 and one 20-inch bar and one 9-inch guide train; product, bar iron and steel mine rails, angle bars, and structural shapes; annual capacity, 60,000 tons.

The open-hearth department, built in 1902–3 and completed in June, 1903, contains 6 Siemens 50-gross-ton furnaces (5 basic and one acid); first basic open-hearth steel made June 29, 1903; acid open-hearth steel not made down to April 30, 1904; product, ingots and machine castings for the use of the company; annual capacity, 200,000 tons.

The 40-inch blooming mill department was built in 1902–3; it contains five 4-hole soaking pits and one 40-inch reversing mill; product, billets and blooms; annual capacity, 350,000 tons.

One 24-inch reversing mill, one 12 and one 14-inch continuous mill, and mills for the manufacture of hoops and cotton-ties are not yet completed; annual capacity of hoops and cotton-ties, 30,000 tons.

Fuel used in all departments, coal and producer gas.

WIRE-ROD, WIRE-NAIL, AND WIRE DEPARTMENTS.

The wire-rod department was built in 1902–3 and contains one double Garrett mill; mill No. 1 was completed in July, 1903, but mill No. 2 is not yet completed; this department contains 4 Laughlin heating furnaces, and the following wire-rod trains: one 16-inch continuous, one 14-inch, and six 10-inch trains for two mills; sizes of rods made, No. 5 American gauge and all larger sizes; annual capacity of each mill, 120,000 tons.

The wire-drawing and wire-nail departments were built in 1902–3 and first put in operation in July, 1903. The wire department contains 304 drawing blocks with an annual capacity of 200,000 tons; product, wire, barbed wire, field fencing, and bale ties; provision is made for manufacturing coppered wire and straight copper wire. The wire-nail department contains 280 machines; product, all sizes of steel wire nails and staples; annual capacity, 2,500,000 kegs.

BUILDING SHEET AND BLACK PLATE MILLS.

Work upon the necessary mills for the sheet and black plate departments was commenced in 1902; not completed in April, 1904;

eight 26-inch hot and five 20-inch cold sheet and black plate mills are to be installed; estimated annual capacity, 30,000 tons of sheets and 30,000 tons of black plates.

BUILDING TINPLATE AND TERNE PLATE WORKS.

Work upon the tinplate and terne plate departments was commenced in February, 1902; they are to be equipped with 22 sets, 17 for tinplates and 5 for terne plates; estimated weekly capacity, 8,000 boxes of tinplates and 2,000 boxes of terne plates.

BOLT, NUT, RIVET, AND SPIKE FACTORIES.

Minnequa Bolt, Nut, and Rivet Works, Pueblo, Colorado. Product, iron and steel bolts, nuts, and rivets. Sizes and kinds: machine bolts, from ¼ inch to 1 inch and all sizes for bridge work and pipe bands; nuts, square and hexagon, from ½ inch to 1½ inches, all standards; rivets, from ½ inch to 1¼ inches, with button, cone, and countersunk heads. Annual capacity, 5,000 tons.

Minnequa Spike Works, Pueblo, Colorado. New spike factory, completed in 1903, contains 3 automatic spike machines; old spike factory, which is still in operation, contains 6 hand-fed machines; product, all sizes and kinds of railroad spikes; annual capacity, in kegs of 200 pounds, 300,000 kegs.

CAST-IRON PIPE AND IRON, BRASS, AND STEEL FOUNDRIES.

Minnequa Cast Iron Pipe Works, Pueblo, Colorado. Built in 1893; product, cast-iron gas and water pipe; sizes, from 3 to 20 inches; daily melting capacity, 60 tons.

Minnequa Foundries, Pueblo, Colorado. Product, iron, brass, and open-hearth steel castings; annual capacity, 24,000 tons of iron, 100 tons of brass, and 1,000 tons of steel castings, the latter for the company's use only. A new foundry was completed in 1903, the old one being dismantled in that year.

Connected with the Minnequa Works are machine, boiler, blacksmith, and roll shops; also a power and pumping station.

TOTAL ANNUAL CAPACITY.

Total annual capacity of the Minnequa Works: 600,000 gross tons of Bessemer steel ingots, 200,000 tons of open-hearth steel ingots and castings, 350,000 tons of blooms and billets, 300,000 tons of steel rails, 60,000 tons of bar iron, steel mine rails, structural shapes, etc., 240,000 tons of wire rods, 30,000 tons of hoops and cotton ties, (building,) 200,000 tons of wire, 2,500,000 kegs of wire nails and staples, 30,000 tons of sheets and 30,000 tons of black plates, (building,) 520,000 boxes of tin and terne plates, (building,) 5,000 tons of bolts, nuts, and rivets,

300,000 kegs (200 pounds) of railroad spikes, 18,000 tons of cast-iron pipe, and 24,000 tons of iron and 100 tons of brass castings.

RAILROADS.

The Colorado Fuel and Iron Company owns 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 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.

COAL LANDS, COKE OVENS, AND LIMESTONE QUARRIES.

The company owns approximately 300,000 acres of coal land 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, and other points in Colorado, and at Los Cerrillos, in New Mexico. The annual capacity of these coal mines is about 5,000,000 tons.

In addition it owns and operates 3,021 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 200,000 net tons. The company also operates large limestone quarries at Lime and Howard, Colorado.

ROLLING MILL AT LARAMIE.

The Colorado Fuel and Iron Company owns all the capital stock of the Laramie Iron and Steel Company, which formerly operated under lease a rolling mill at Laramie, Wyoming, owned by the Union Pacific Railroad Company. The lease held by the Colorado Fuel and Iron Company recently expired and has not been renewed. The latter company has removed to its works at Pueblo all machinery installed by it in the Laramie works.

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; Guy Darst, 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: Crocker Brothers, New York; N. S. Bartlett & Co., Boston; the Domhoff and Joyce Company, Cincinnati; and Hickman, Williams & Co., Chicago, Louisville, and St. Louis. For charcoal pig iron: R. C. Hoffman & Co., Baltimore.

Capital stock authorized, $10,000,000, all outstanding. Bonded indebtedness, $7,484,500. The company operates these works:

BLAST FURNACES—8 COKE AND 2 CHARCOAL STACKS.

Bristol Furnace, Bristol, Tenn. 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 and forge pig iron; annual capacity, 50,000 tons. Brand, "Bristol." —*Active in 1903.*

Crozer Furnaces, Roanoke, Roanoke county, Virginia. Two stacks: No. 1 Furnace, 70 x 17¼, built in 1882–3 and first put in operation May 29, 1883; four 18 x 60 two-pass stoves; No. 2 Furnace, 70 x 16¼, built in 1889 and blown in October 19, 1889; three 18 x 60 four-pass Whitwell stoves and one 18 x 60 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 molds.—*Active in 1903.*

Dora Furnace, Pulaski City, Pulaski county, Virginia. One stack, 75 x 18, built in 1891–2 and blown in in May, 1892; one 18 x 75 two-pass stove and three 20 x 60 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 1903.*

Fosters Falls Furnace, Fosters Falls, Wythe county, Virginia. Furnace on the Cripple Creek branch of the Norfolk and Western Railway. One stack, 34 x 10, built in 1881; abandoned in 1896;

revived and blown in in August, 1903; 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. (Formerly operated by the Fosters Falls Mining and Manufacturing Company.)—*Active in 1903.*

Max Meadows Furnace, Max Meadows, Wythe county, Virginia. One stack, 75 x 20, built in 1890–1; first blown in November 19, 1895; rebuilt in 1899; one 20 x 70 two-pass and three 20 x 60 four-pass Whitwell stoves; fuel, Tom's Creek and Pocahontas coke; ores, Virginia limonite and mountain; product, foundry and forge pig iron; annual capacity, 60,000 tons. Brand, "Max Meadows."—*Active in 1903.*

Radford-Crane Furnace, Radford, Montgomery county, Virginia. One stack, 75 x 17, begun in 1890 and completed in 1892; first blown in in December, 1899; 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, 50,000 tons. Brand, "Radford."—*Active in 1903.*

Reed Island Furnace, Reed Island, Pulaski county, Virginia. 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, Reed Island limonite; product, cold-blast charcoal pig iron; annual capacity, 3,000 tons. Brand, "Reed Island."—*Active in 1903.*

Watts Furnaces, Middlesborough, Bell county, Kentucky. Two stacks, one, 74¼ x 16½, and one, 74¼ 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 Stonega coke; ores, Ducktown, Ben Hur, Truro, Bronco, and Cumberland Gap; product, foundry and forge pig iron; total annual capacity, 110,000 tons. Brand, "Watts."—*Active in 1903.*

Total annual capacity of the 10 stacks: 420,000 gross tons of coke pig iron and 6,000 tons of charcoal pig iron.

ROLLING MILLS AND STEEL WORKS—2.

Crescent Horse Shoe and Iron Works, Max Meadows, Wythe county, Virginia. Built in 1892 and first put in operation November 8, 1892; 16 puddling furnaces, 3 heating furnaces, 5 bending machines, 5 pressing machines, 22 punching machines, 2 grubbers, and 2 trains of rolls (one 9 and one 18-inch); product, merchant bar iron; annual capacity, 12,000 tons. Fuel, Tom's Creek coal. Brand, "Crescent." Selling agent, Guy Darst, Bristol, Tennessee. (Horseshoe machinery idle.)

Watts Works, Middlesborough, Bell county, Kentucky. Built in

1890–3; seven 25-gross-ton basic open-hearth steel furnaces (4 completed and 3 partly completed) with an annual capacity of 96,000 tons of ingots, two 4-hole soaking pits, and one 32-inch reversing blooming mill; product, billets, blooms, and slabs; annual capacity, 75,000 tons. Fuel, manufactured gas. Brand, "Watts."—*Idle and not likely to resume operations soon.*

Total annual capacity of the 2 rolling mills and steel works: open-hearth ingots, 96,000 gross tons; rolled products, 87,000 tons.

CARBUILDING WORKS—2.

Dora Car Shops, Pulaski, Virginia. Product, wooden coal and iron-ore cars; annual capacity, 2,500 cars.

Virginia and Southwestern Railway Car Shops, Bristol, Tennessee. Repair and build over locomotives, cars, etc., in use by the Virginia and Southwestern Railway Company; also occasionally build new cars for the use of the company.

CAR-WHEEL WORKS, IRON FOUNDRIES, AND MACHINE SHOPS.

Dora Foundry, Pulaski, Virginia. Product, self-oiling tram car wheels; annual capacity, 25,000 wheels. Also gray iron castings up to 10,000 pounds; annual capacity, 3,000 tons. A machine shop is connected with these works.

Middlesborough Foundry, Middlesborough, Kentucky. Product, gray iron castings.—*Idle and not likely to be again operated.*

CAST-IRON PIPE WORKS.

Radford Pipe Works, Radford, Virginia. Product, cast-iron gas and water pipe. Leased to and operated by the Glamorgan Pipe and Foundry Company, of Lynchburg, Virginia.

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 Vaughts-

ville, 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, COAL LANDS, AND RAILROADS.

The company has 800 coke ovens at Tom's Creek, Virginia, with an annual capacity of 350,000 net tons. It also has 174 coke ovens at Looney Creek, Virginia, with an annual capacity of 78,000 net tons. Total annual capacity of the 974 ovens, 428,000 net tons of coke.

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 amounts to about 650,000 tons of commercial coal and 715,000 tons of slack. The latter is shipped to coke ovens.

In addition the company owns all the first mortgage bonds and all the stock of the Virginia and Southwestern Railway Company, which extends from Big Stone Gap via Bristol to Mountain City, and connects at Bristol with the Norfolk and Western Railway and the Southern system of railways, and at Appalachia, Va., with the Louisville and Nashville Railway. It has 137 miles of railroad in operation, and owns 16 locomotives, 8 passenger cars, and 824 freight, road, and other cars.

ALLEGHANY ORE AND IRON COMPANY.

Alleghany Ore and Iron Company; general offices, Clifton Forge, Virginia. Branch offices, Pennsylvania Building, corner of Fifteenth and Chestnut streets, Philadelphia. *Officers at Philadelphia:* C. H. Zehnder, President, and A. C. McFarland, Secretary. *Officers at Clifton Forge:* W. G. Brockway, Treasurer; J. L. Blizzard, Comptroller; W. W. Taylor, General Superintendent; and R. S. Lackey, Assistant to General Superintendent.

Sales Agents: Rogers, Brown & Co., Philadelphia, New York, Boston, Cincinnati, Cleveland, Buffalo, Chicago, and Pittsburgh.

Capital stock, $2,400,000, of which $875,000 is preferred and $1,525,000 is common. The Alleghany Ore and Iron Company owns and operates the following works:

BLAST FURNACES—3.

Alleghany Furnace, Iron Gate, Alleghany county, Virginia. One stack, 65 x 13½, built in 1891–2 and blown in December 1, 1892; rebuilt in 1900; 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." (Formerly operated by the Alleghany Iron and Steel Company.)—*Active in 1903.*

Buena Vista Furnace, Buena Vista, Rockbridge county, Virginia. One stack, 70 x 16½, built in 1889–90 and blown in December 12, 1890; rebuilt in 1903; 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." (Formerly operated by the Virginia Iron, Coal, and Coke Company.)—*Active in 1903.*

Gem Furnace, Shenandoah, Page county, 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 and forge pig iron; annual capacity, 36,000 tons. Brand, "Gem." (Formerly operated by the Empire Steel and Iron Company.)—*Active in 1903.*

Total annual capacity of the 3 furnaces: 120,000 gross tons.

IRON-ORE MINES AND LIMESTONE QUARRIES.

The company owns and operates the following iron-ore mines in Virginia: The Oriskany mine, at Oriskany and Lignite; the Reid mine, at Oriskany; and the Goshen mine, at Goshen. The annual capacity of these mines is about 225,000 tons. The company also owns and operates 25 acres of limestone lands at Craigsville, Augusta county, Virginia, where its quarries have an annual capacity of about 50,000 tons of stone.

VICTORIA COAL AND COKE COMPANY.

Victoria Coal and Coke Company; general offices, Clifton Forge, Alleghany county, Virginia. Branch offices, Pennsylvania Building, Philadelphia. *Officer at Philadelphia:* C. H. Zehnder, President. *Officers at Clifton Forge:* W. W. Taylor, Vice-President;

W. G. Brockway, Treasurer; and J. L. Blizzard, Auditor. *Officer at Caperton, West Virginia:* A. W. Roberts, Business Manager.

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, Alabama; New York office, 100 Broadway. *Officers at New York:* Don H. Bacon, Chairman; Frank S. Witherbee, First Vice-President; F. A. Burr, General Sales Agent; and L. T. Beecher, Secretary and Treasurer. *Officers at Birmingham:* Charles McCrery, Second Vice-President; Willard Wilson, Assistant to Second Vice-President; L. Hoover, Auditor; J. R. Vail, Local Treasurer; and W. A. Major, Purchasing Agent. *Officer at South Pittsburg, Tennessee:* G. H. Crozer, Manager Tennessee Division.

Selling Agents: For steel, steel rails, pig iron, and rolling mill products, F. A. Burr, General Sales Agent, 100 Broadway, New York, and J. H. Mohns, Birmingham, Alabama; for coal and coke, A. H. Carpenter, Birmingham, Alabama.

Kinds of Pig Iron made: 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," "Whitewell," and "Sewanee." For coke: "Pratt," "Blue Creek," "Bessemer," "Jasper," "Whitewell," "Tracy City," and "Bi-product."

Capital stock: Common, $22,552,800; preferred, $248,300. Transfer Agents: Hanover National Bank, of New York. The Tennessee Coal, Iron, and Railroad Company operates the following works:

BLAST FURNACES—16 COMPLETED AND 1 BUILDING.

Alice Furnaces, Birmingham, Jefferson county, Ala. Two stacks: No. 1, 75 x 15, built in 1879–80 and put in blast November 23,

1880; raised to present height in 1890; three Gordon-Whitwell-Cowper stoves. No. 2, 75 x 18, built in 1883 and put in blast July 24, 1883; rebuilt in 1902; three Whitwell stoves. Fuel, Pratt coke made in the company's ovens; ores, red and brown from the company's mines; product, basic and foundry pig iron; total annual capacity, 105,000 tons. Brand, "Alice."—*Active in 1903.*

Bessemer Furnaces, Bessemer, Jefferson county, Alabama. Five stacks: Nos. 1 and 2, each 75 x 17, 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 and spiegeleisen and ferromanganese; total annual capacity, 288,000 tons. Brand, "DeBardeleben."—*Active in 1903.*

Ensley Furnaces, Ensley, Jefferson county, Alabama. Five completed stacks and one stack building. Completed stacks, four 80 x 20, built in 1887, 1888, and 1889, and one, 80 x 18, built in 1899–1900; No. 1 blown in March 19, 1889, and rebuilt in 1901; No. 2 blown in December 1, 1888, No. 3, June 5, 1888, No. 4, April 9, 1888, and No. 5, October 12, 1900; four Gordon-Whitwell-Cowper stoves to each furnace; 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, 315,000 tons. Brand, "Ensley." One Uehling pig-iron casting machine. Ground for the building furnace, which will be known as No. 6, was broken on May 30, 1903; it will be 85 x 20 and will have four Kennedy two-pass stoves, each 93 x 21; basic pig iron will be made; estimated annual capacity, 100,000 tons; furnace will probably be completed in September, 1904.—*Active in 1903.*

Oxmoor Furnaces, Oxmoor, Jefferson county, Ala. Two 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, 122,500 tons. Brand, "Eureka."—*Active in 1903.*

South Pittsburg Furnaces, South Pittsburg, Marion county, 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.)—*Active in 1903.*

Total annual capacity of the 16 completed furnaces, 940,500 gross tons; of the building furnace, 100,000 tons: total, 1,040,500 tons.

ROLLING MILLS AND STEEL WORKS—3.

Bessemer Rolling Mills, Bessemer, Jefferson county, 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, and light and heavy plates up to 65 inches wide; annual capacity, 60,000 tons. Fuel, coal and manufactured gas.

Steel Casting Department, Ensley, Jefferson county, Alabama. Built in 1900; one 10-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, 12,000 tons. Fuel, producer gas. (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, Jefferson county, Alabama. Built in 1898–9; first heat poured November 30, 1899; ten 50-gross-ton basic open-hearth furnaces (9 tilting and one stationary) with an annual capacity of 350,000 tons of ingots; one reheating coal furnace, four 4-hole soaking pits, and one 44-inch blooming mill; product, blooms, billets, and slabs; also one 27-inch rail train equipped for the production of either steel rails, splice bars, small billets, sheet bars, I beams, channels, or angles; first steel rail rolled November 14, 1902; estimated annual capacity, from 150,000 to 300,000 tons of rails or billets. Fuel, producer gas. Connected with the works are one 250-gross-ton rolling acid-lined primary furnace and one 15-gross-ton Bessemer converter for desiliconizing and decarburizing molten metal for the open-hearth steel furnaces, the molten 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. (Works 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 3 works: open-hearth steel ingots, 350,000 gross tons; steel castings, 12,000 tons; rails or billets, from 150,000 to 300,000 tons; other finished rolled products, 60,000 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 Jasper, in Alabama, and at Whitwell, Victoria, and Tracy City, 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, Spark's Gap, Champion, McMath, Martiban, Standiford, Giles, and Bessemer, in Alabama, and near Emerson, in Georgia.

Extensive limestone and dolomite quarries at Dolcito, Vann, Calcis, and Bessemer, 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 304,000 acres of coal land, 39,000 acres of iron-ore land, 69,000 acres of undeveloped mineral land, and 29,000 acres of miscellaneous timber and other land, making a grand total of 441,000 acres.

SLOSS-SHEFFIELD STEEL AND IRON COMPANY.

Sloss-Sheffield Steel and Iron Company; principal office, Jersey City, N. J.; operating office, Birmingham, Alabama. *Officers at Birmingham:* J. C. Maben, President; J. W. McQueen, Second Vice-President and General Sales Agent; E. L. Morris, Secretary and Treasurer; E. J. Thomas, Jr., Auditor; J. J. Ashton, Acting Purchasing Agent; and J. W. McCune, Birmingham, and J. S. Colyar, Sheffield, Furnace Managers. *Officer at Richmond, Vir-*

ginia: Joseph Bryan, First Vice-President. *Officer at New York:* H. A. Murray, Assistant Secretary, 28 Nassau st.

Selling Agents: J. W. McQueen, General Sales Agent, and A. S. Leath, Southern Sales Agent, Birmingham; Davis & Bryan, Times Building, Richmond, Virginia; Hugh W. Adams, 15 Beekman street, New York, and 185 Summer street, Boston; David Evans, 1030 Monadnock Block, Chicago; J. K. Dimmick & Co., New Land Title Building, Philadelphia; Bryan Robertson, Murtland Building, Pittsburgh; Robert Field, 1105 Traction Building, Cincinnati; William Wieman, 605 Citizens Bank Building, Cleveland; E. C. Smith, 506 Commonwealth Trust Building, St. Louis; W. H. Palmer, Pioneer Press Building, St. Paul, Minnesota; 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 $7,500,000 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 operates or controls the following works:

BLAST FURNACES—7.

Hattie Ensley Furnace, Sheffield, Colbert county, Alabama. One stack, 75 x 17, built in 1887 and first put in blast December 31, 1887; remodeled in 1900 and rebuilt in 1903; four Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 70,000 tons. Brand, "Sheffield."—*Active in 1903.*

Lady Ensley Furnace, Sheffield, Colbert county, Alabama. (Operated by the North Alabama Furnace Company, two-thirds of the stock of which is owned by the Sloss-Sheffield Steel and Iron Company.) One stack, 75 x 17, built in 1887–9 and first blown in April 25, 1889; remodeled in 1900–1; four Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry and mill pig iron; annual capacity, 70,000 tons. Brand, "Lady Ensley." —*Active in 1903.*

Philadelphia Furnace, Florence, Lauderdale county, 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; four Whitwell stoves, each 70 x 20; fuel, coke; ore, brown hematite from the company's mines in Russellville, Franklin county, Alabama; product, foundry pig iron; annual capacity, 70,000 tons. Brand, "Florence."—*Active in 1903.*

Sloss Furnaces, Birmingham, Jefferson county, Alabama. Four stacks: No. 1, 82½ x 18, built in 1881–2, put in blast April 12, 1882, and rebuilt in 1895 and 1901; No. 2, 73 x 18, built in 1882 and rebuilt in 1902; No. 3, 73 x 17, built in 1887–8, blown in in October, 1888, and rebuilt in 1901; No. 4, 73 x 17, built in 1887–9, blown in in February, 1889, and rebuilt in 1901; five Whitwell, eight Gordon-Whitwell-Cowper, and three two-pass 18 x 70 and two new four-pass stoves; 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 mill pig iron; total annual capacity, 225,000 gross tons. Brand, "Sloss."—*Four furnaces active in 1903.*

Total annual capacity of the 7 furnaces: 435,000 gross tons.

IRON-ORE MINES, COAL LANDS, COKE OVENS, ETC.

By the purchase of the four blast furnaces of the Sloss Iron and Steel Company the Sloss-Sheffield Steel and Iron Company acquired 951 coke ovens, 30,000 acres of iron-ore lands, 21,000 acres of coal lands, and extensive limestone quarries; 487 coke ovens have since been added.

The Sloss-Sheffield Steel and Iron Company owns two-thirds of the stock of the North Alabama Furnace Company, of Sheffield, Colbert county, Alabama, which operates 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, 13,000 acres of brown iron-ore lands, and 300 coke ovens.

It has also 25,000 acres of coal lands on the line of the Southern Railway, south of Jasper, Alabama. On this property two mines are at present operated, 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 offices, Birmingham, Ala. *Officers at Birmingham:* T. G. Bush, President; Charles T. Westcott, Secretary and Treasurer; and G. M. Bowers, Auditor. *Officer at Baltimore:* Douglas H. Gordon, Vice-President. *Selling Agents:* Matthew Addy & Co., St. Louis, Cincinnati, Pittsburgh, New York, and Philadelphia.

Capital stock, $5,000,000, of which $2,500,000 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, Talladega county, 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; four 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 pig iron; total annual capacity, 100,000 tons. Brand, "Clifton."—*Active in 1903.*

Gadsden-Alabama Furnaces, Gadsden, Etowah county, Alabama. Two stacks: No. 1, 75 x 18, built in 1887–8 and first blown in October 14, 1888; idle; stove equipment and blowing engines used in equipping furnace No. 2; and No. 2, 86 x 19, built in 1902–3 and blown in August 22, 1903; four Whitwell stoves, each 85 x 20; fuel, coke; ores, local red and brown hematite; product, foundry pig iron; total annual capacity, 100,000 tons. Brand, "Etowah."—*No. 1 idle; No. 2 active in 1903.*

Total annual capacity of the 4 furnaces: 200,000 gross tons.

IRON-ORE LANDS, COAL LANDS, COKE OVENS, ETC.

The company has acquired 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.

It has also acquired the Standard Coal Company's property, in Tuscaloosa county, Alabama, which contains 32,211 acres of coal and timber land. It is estimated that from 18,000 to 24,000 acres contain workable seams of coal. About 14,000 acres are covered

with yellow pine timber. There are now 515 completed coke ovens on the property.

The company acquired with the Clifton Furnaces about 2,500 acres of mineral lands and 33,292 acres of other lands, of which from 10,000 to 12,000 acres are well timbered. With the Gadsden-Alabama Furnace it acquired about 730 acres of ore and other lands.

In addition to the above the company has acquired about 1,207 acres of land near Gadsden, Alabama, containing deposits of red iron ore. It has also acquired a large acreage of brown iron-ore property available for its furnaces at Ironaton and Gadsden.

At Hematite, Georgia, it has acquired 1,700 acres of brown iron-ore lands. These mines are equipped with ore washers.

The company has also purchased tracts of coal lands at Brookwood, Alabama, and in the vicinity of Birmingham.

It owns valuable red iron-ore properties near Attalla and Gadsden, the latter property being within one mile of the Gadsden-Alabama Furnaces and the former property within five miles. On both properties there are developed mines with a capacity at present of from 400 to 600 tons of iron ore per day.

In 1901 the company acquired the property of the Jefferson Coal and Railway Company, at Lewisburg, near Birmingham, Alabama, comprising over 3,000 acres, all underlaid with coal. On this property there are two coal openings and 250 coke ovens. Steam and domestic coal are mined and furnace and foundry coke are made.

SOUTHERN CAR AND FOUNDRY COMPANY.

Southern Car and Foundry Company; general offices, Birmingham, Alabama. *Receivers:* T. G. Bush, Birmingham, Alabama, and Thomas A. Gillespie, Empire Building, 71 Broadway, New York. The company operates the following works:

BLAST FURNACES—1.

Coosa Furnace, Gadsden, Etowah county, Alabama. One stack, 64 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 in 1902; hot-blast; fuel, charcoal; ores, local red and brown hematite; product, pig iron for car-wheel and foundry purposes; annual capacity, 15,000 tons. (Formerly called Gadsden Furnace.)—*Active in 1903. For sale.*

Annual capacity of the blast furnace: 15,000 gross tons.

CARBUILDING WORKS AND GRAY IRON FOUNDRIES.

Gadsden Works, Gadsden, Alabama. Product, wooden freight cars; annual capacity, 1,800. Also make gray iron castings.—*For sale.*

Lenoir Works, Lenoir City, Tennessee. Product, all kinds of wooden freight, mine, logging, and cane cars; annual capacity, 3,000 standard freight cars.—*For sale.*

Memphis Works, Memphis, Tennessee. Works at Binghampton, Tennessee. Product, freight, caboose, tank, logging, and other cars; annual capacity, 3,000 cars. Also make gray iron castings.—*For sale.*

Total annual capacity of the 3 carbuilding works: 7,800 cars.

CAR AND LOCOMOTIVE WHEEL WORKS.

Memphis Works, Memphis, Tennessee. Works at Binghampton, Tennessee. Product, chilled cast-iron car and locomotive wheels; annual capacity, 48,000 wheels.—*For sale.*

IRON AND STEEL BOLT AND RIVET WORKS.

Memphis Works, Memphis, Tennessee. Works at Binghampton, Tennessee. Product, standard sizes of bolts and rivets.—*For sale.*

IRON AND STEEL FORGINGS—3.

Gadsden Works, Gadsden, Alabama. Product, car forgings.—*For sale.*

Lenoir Works, Lenoir City, Tennessee. Product, car forgings.—*For sale.*

Memphis Works, Memphis, Tennessee. Works at Binghampton, Tennessee. Product, car forgings.—*For sale.*

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 and steel works, and forges and bloomaries 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 Rolling Mill, Portland Iron and Steel Company, 1009 Board of Trade Building, Boston, Mass. Works at Ligonia, South Portland, Cumberland county, 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; 6 single busheling furnaces, 2 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 10 and 16-inch tandem, one 3-high 18-inch muck, and one 3-high 18-inch bar); product, merchant bar iron, angles, bolt iron, and rolled iron shafting; annual capacity, 30,000 tons. Fuel, bituminous coal. Brands, "Refined" and "Special." Roland H. Boutwell, President; Roswell M. Boutwell, Treasurer; Wm. S. McGowan, Jr., Secretary; Wm. C. Cutler, General Manager.

Number of rolling mills in Maine: one. There have been no blast furnaces in Maine for a number of years.

MASSACHUSETTS.

CHARCOAL FURNACES—2.

Richmond Iron Company; main office, Richmond Furnace P. O.,

Berkshire county. Two stacks in Berkshire county: Richmond Furnace, at Richmond, 32 x 9½, built in 1829 and rebuilt in 1863; and Cheshire Furnace, at Cheshire, 32 x 9½, built in 1850 and rebuilt in 1870; warm blast; iron stoves; fuel, charcoal; ore, local brown hematite from mines owned by the company; total annual capacity, 9,000 tons of foundry pig iron for cannon, car wheels, and machinery. Brand, "Richmond." M. H. Robbins, President, Lakeville, Conn.; C. W. Barnum, Vice-President and Secretary, Lime Rock, Conn.; R. A. Burget, Treasurer and General Manager, Richmond Furnace, Mass. Charcoal kilns, with an annual capacity of about 100,000 bushels, are connected with the furnaces. (Formerly operated by the Richmond Iron Works. Van Dusenville Furnace, Van Dusenville, built in 1834, abandoned.)—*Cheshire Furnace was last active in 1893 and Richmond Furnace was active in 1903.*

Number of furnaces in Massachusetts: 2 charcoal stacks.

ROLLING MILLS AND STEEL WORKS—13.

Danvers Iron Works, The Sylvester Company, Mason Building, 70 Kilby st., Boston. Works at Danversport, Essex county. Built in 1831; burned and rebuilt in 1883; again burned in 1894 and rebuilt in 1895; 3 heating furnaces, 2 trains of rolls, (one 8 and one 12-inch,) and 4 spike machines; product, merchant bar iron, bolt iron, scrap rods, railroad and ship spikes, and tie rods and other miscellaneous forgings; annual capacity, 4,500 tons. Fuel, soft coal. Brand, "Danvers." B. F. Sylvester, President; John P. Sylvester, Treasurer; H. W. Sylvester, Superintendent. (Formerly operated by Sylvester & Co.)

Kinsley Iron and Machine Company, Canton, Norfolk county. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process; stock company formed in 1855; 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 is connected with the works for the production of wagon axles, etc.; also an iron foundry and a machine shop. Oliver Ames, President; Oakes Ames, Treasurer; Joseph B. Hall, Assistant Treasurer; William H. Bense, Manager. Sales made by the company.

Mount Hope Iron Works, Mount Hope Iron Company, Somerset, Bristol county. Built in 1875; one single and 6 double puddling furnaces, 12 heating furnaces, 100 cut-nail machines, and two 18-inch trains of rolls; product, nails, skelp iron, tack and shovel plate, etc.; annual capacity, single turn, 7,000 tons of rolled products and 120,000 kegs of cut nails. Fuel, bituminous coal. Brand, "Mount Hope Iron Works." Job M. Leonard, Treasurer. Selling agents, F. M. Trafton, 176 Federal street, Boston, Massachusetts; William L. Bowers, Banigan Building, Providence, Rhode Island.

Pope-Robinson Company, Hyde Park, Norfolk county. Two crucible steel-melting furnaces built in 1902–3; first steel made in January, 1903; product, castings up to 250 pounds in weight; annual capacity, 75 tons. Fuel, petroleum. Also builds automobiles. John T. Robinson, President; Edward W. Pope, Secretary, Treasurer, and Manager.

South Works, American Steel and Wire Company of New Jersey, Chicago. Works at Worcester, Mass.—*For description see page 45.*

Stanley (The) Works, (successors to the Bridgewater Iron Company,) Bridgewater, Plymouth county. Built in 1785 and rebuilt in 1874 and 1900; 3 trains of rolls, 11 heating furnaces, one air furnace, 2 cupolas, and 10 cut-nail machines; steam and water power; product, Bessemer and open-hearth steel bands, hoops, and tack plate; also chilled and sand rolls and all kinds of heavy gray iron castings; annual capacity, 25,000 tons of rolled products, 5,400 kegs of cut nails, 6,000 tons of gray iron castings, and 2,000 tons of air-furnace castings. Fuel, coal. William H. Hart, President and Treasurer, George P. Hart, Vice-President, L. H. Pease, Secretary and Assistant Treasurer, and E. A. Moore, General Superintendent, New Britain, Conn.; C. R. Fitch, Manager, Bridgewater, Mass. (Formerly operated by the Bridgewater Foundry, Machine, and Rolling Mill Company.)

Thomson-Houston Electric Company, Steel Foundry Department, 42 Centre st., Lynn, Essex county. (Operating for the General Electric Company; general office, 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 steel made March 4, 1893; product, steel castings; annual capacity, 9,000 tons. Fuel, manufactured gas. C. A. Coffin, President; Eugene Griffin and E. W. Rice, Jr., Vice-Presidents; M. F. Westover, Secretary; Henry W. Darling, Treasurer.

Tool Steel Casting Company, Clark avenue, near Webster avenue, Chelsea, Suffolk county. Product, hard and soft crucible steel castings for automobiles, machinery, tools, dies, etc. Lundin &

Munro, Proprietors. May organize a new company and build works elsewhere.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. Built about 1820 and rebuilt in 1846; one 3-gross-ton Clapp-Griffiths steel converter added in 1887 and first steel made in December, 1887; one 20-gross-ton basic open-hearth steel furnace, with gas producers, added in 1893 and first steel made June 8, 1893; 3 blooming furnaces, 4 heating furnaces, 4 trains of rolls, (one 24-inch blooming, one 24-inch finishing, and one 18-inch nail and one 17-inch tack plate,) and 150 cut-nail machines; steam and water power; annual capacity, 30,000 tons of 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." The erection of an additional 50-gross-ton basic open-hearth steel furnace is under consideration. Horace P. Tobey, Treasurer. Goods sold at the factory and at the company's store at 76 Pearl st., Boston.

United States Navy Yard, Charlestown, Suffolk county. Mill built in 1868; 21 forge fires, 38 chain fires, 5 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, bars for chain, cable, and anchor iron, etc., for Government use; annual capacity, single turn, 800 tons. Also makes chains, forgings, anchors, chain appendages, etc. Fuel, coal and gas from naphtha.

United States Steel Company, Everett, Middlesex county. Six 4-pot crucible steel-melting furnaces; first steel made in September, 1899; annual capacity, 400 tons. Two 15-gross-ton acid open-hearth steel furnaces built in 1900; first steel made December 20, 1900; annual capacity, 5,000 tons. Product, steel castings from ¼ of a pound to 60,000 pounds. Specialty, "Jupiter Steel Castings." Fuel, manufactured gas and coal. W. E. Pearson, President; H. B. Whall, Vice-President; George C. Fitton, Secretary and Treasurer; L. H. Miller, Assistant Treasurer. A machine shop is connected with the works.

Watertown Arsenal, Watertown, Middlesex county. 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 Government use; annual capacity, 1,200 tons. Fuel, coke.

Worcester Steel Foundry Company, 67 Union st., Worcester. Works at Millbury, Worcester county. Built in 1902 and first crucible steel made in that year; three crucible steel-melting furnaces; number of pots, 100; product, small castings ranging from 5 to 600 pounds; annual capacity, 1,200 tons. Fuel, crude oil. George

C. Whitney, President; W. E. Oakley, Vice-President and Superintendent; Edgar Whidden, Secretary; William H. Cook, Treasurer.

Number of rolling mills and steel works in Massachusetts: 13. Of these one has a Clapp-Griffiths steel plant, one makes Tropenas steel, 4 make open-hearth steel, and 4 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 built in 1903–4; first steel made in May, 1904; product, steel castings; estimated annual capacity, 2,500 tons. Fuel, coke. Darwin Almy, President; F. W. Hartwell, Vice-President; Charles F. H. Almy, Secretary; E. M. Shaw, Treasurer and General Manager; A. H. Jameson, Superintendent.

Rhode Island Horse Shoe Works, Rhode Island Perkins Horse Shoe Company, Providence. Works at Valley Falls, Providence county, 6 miles from Providence. Built in 1867 and rebuilt in 1874; burned January 7, 1887, and rebuilt and running in full June 1, 1887; 7 scrap and 7 heating furnaces, 10 trains of rolls, (seven 8 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 United States Standard Horse and Mule Shoes," "Perkins' Tips," "Perkins' XL Steel Shoes," "Perkins' Toe-weight Shoe," "Perkins' Side-weight Shoe," "Perkins' Cow-boy Shoe," etc., and "Perkins' Patent Toe-Calks." F. W. Carpenter, President; R. W. Comstock, Secretary; Charles R. Stark, Treasurer; G. L. Bowen, Assistant Secretary.

Washburn Wire Company, Phillipsdale, Providence county. 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 open-hearth steel furnaces (one acid and one basic) with a total annual capacity of 20,000 tons of ingots (10,500 tons of acid and 9,500 tons of basic); 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 November 25, 1901; one continuous heating furnace and 4 trains

of rolls (one 10, one 16, one 18, and one 26-inch); also equipped with wire-drawing blocks and wire-nail machines; product, rods, wire, and wire nails; annual capacity, 20,000 tons of rods, 5,000 tons of wire, and 90,000 kegs of wire nails; fuel, 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 street, New York; annual capacity, 12,000 tons. Eugene F. Phillips, President; E. A. Smith, Vice-President; Joseph Remick, Treasurer; C. R. Remington, Jr., Secretary.

Number of rolling mills and steel works in Rhode Island: 4. Of these one makes open-hearth steel and one makes Tropenas steel.

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 97.*

Lime Rock Furnace, Barnum Richardson Company, Lime Rock. One stack; fuel, charcoal.—*For description see page 97.*

Number of charcoal furnaces in Connecticut: 3 stacks.

ROLLING MILLS AND STEEL WORKS—9.

Aetna (The) Nut Company, Southington, Hartford county. Built in 1872–3; one single puddling furnace, one scrap and 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, wrought butts, and hinges; annual capacity, 10,000 tons. Fuel, coal. S. D. Neal, General Manager; H. H. Clark, President; Benjamin S. Porter, Secretary and Treasurer. Sales made by the company.

American (The) Tube and Stamping Company, Bridgeport, Fairfield county. Hot-rolling mill department built in 1887; 5 heating furnaces and 4 trains of rolls; product, hoop, band, and plate and sheet steel; annual capacity, 30,000 tons. Open-hearth department added in 1902–3; first steel made July 18, 1903; three 40-gross-ton basic furnaces, two 4-hole soaking pits, and one 34-inch blooming train; annual capacity, 72,000 tons of ingots and castings and 60,000 tons of blooms, slabs, and billets. Fuel, manufactured gas. Brand, "Swedoh." Also operates a cold-rolling department with an annual capacity of 15,000 tons; also makes steel tubes, lock-seam pipe, etc. F. A. Wilmot, Pres-

ident and Treasurer; C. D. S. Miller and Charles R. Wilmot, Vice-Presidents; H. W. Nutt, Secretary; A. J. Middlebrook, Assistant Treasurer; R. F. Lewis, Superintendent of Manufacture; Wallace Buell, Manager of Open-hearth Department; and George Damerel, Selling Agent, 253 Broadway, New York. (Formerly operated by the Wilmot and Hobbs Manufacturing Company.)

Collins (The) Company, Collinsville, Hartford county. Established in 1826; 2 scrap and 4 heating furnaces, one 12-inch and one 18-inch train of rolls, 2 hammers, two 20-gross-ton steel-cementing furnaces, four 2-pot crucible steel-melting holes, and one 24-pot Siemens gas steel-melting furnace; steam and water power; product, bar iron and cast steel, all consumed in the production of "Collins" edge tools, steel plows, etc.; annual capacity of finished iron, single turn, 2,250 tons; of steel ingots, 600 tons. Fuel, manufactured gas. Edward H. Sears, President; Meigs H. Whaples, Secretary and Treasurer; William Hill, Agent. Treasurer's and transfer office, Hartford.

Farist (The) Steel Company, Bridgeport, Fairfield county. 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, crucible steel, rolled and hammered; 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." Joel Farist, President; George Windsor, Secretary and Treasurer; J. Windsor Farist, Superintendent. Selling agent, John S. Brewer, Chicago, Illinois.

Malleable Iron Fittings Company, Branford, New Haven county. 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, 3,000 tons. Fuel, manufactured gas. Malleable iron castings are also produced; daily capacity, 30 tons. A. C. Walworth, President; L. J. Nichols, Secretary; A. E. Hammer, Treasurer and Manager; V. T. Hammer, Superintendent.

National Steel Foundry Company, New Haven. Controlled by the National Steel and Wire Company.—*For description see page 99.*

National (The) Wire Corporation, New Haven. Controlled by the National Steel and Wire Company.—*For description see page 99.*

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; Clarence Kennedy Crossan, Secretary and Treasurer; J. E. Schall, General Manager; W. Y. Schall, Superintendent.

Omega (The) Steel Company, 169 East st., New Haven. New York office, 7-9 Warren st. Built in 1902; two special furnaces; first steel made in 1902; product, special tool steel cast in ingots and bars and used in the manufacture of milling cutters, twist drills, reamers, lathe and planer tools, etc.; annual capacity, 5,000 tons of ingots and bars. Fuel, coal, oil, and gas. Frank M. Twitchell, President; Charles Hudson, Vice-President and Treasurer; Robert W. Dunlop, Secretary.

Number of rolling mills and steel works in Connecticut: 9. Of these 3 make open-hearth steel, 2 make crucible steel, one makes blister steel, and one makes special steel.

NEW YORK.

COKE AND MIXED ANTHRACITE AND COKE FURNACES—18 COMPLETED AND 3 BUILDING.

Breaker Island Furnaces, American Steel and Wire Company of New Jersey, Chicago. Furnaces on Breaker Island, opposite Troy, N. Y. Three stacks; fuel, anthracite coal and coke.—*Idle.* *For description see page 41.*

Buffalo and Susquehanna Iron Company, Buffalo, Erie county. Two stacks, each 80 x 20, built in 1902-4; eight Kennedy one-pass stoves, each 22 x 102; fuel, coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 225,000 tons. Brand, "Susquehanna." William A. Rogers, President; F. H. Goodyear, First Vice-President; Charles W. Goodyear, Second Vice-President; Hugh Kennedy, General Manager; Harry D. Carson, Secretary and Treasurer.—*Practically completed but not blown in down to June 1, 1904.*

Buffalo (The) Union Furnace Company, Buffalo. Two stacks: Furnaces A and B; fuel, coke.—*For description see page 107.*

Burden Iron Works, The Burden Iron Company, Troy. One stack; fuel, anthracite coal and coke.—*For description see page 98.*

Genesee Furnace, Genesee Furnace Company, Perry-Payne Building, Cleveland, Ohio. Furnace at Charlotte, Monroe county, New York. One stack, 65 x 17, built in 1868 and rebuilt in 1884 and 1902; three brick stoves; fuel, coke; ore, Lake Su-

perior; product, foundry pig iron, adapted for stove plates and general foundry purposes, and Bessemer, malleable, and gray forge pig iron; annual capacity, 75,000 tons. Brand, "Genesee." James Corrigan, President; Stevenson Burke, Vice-President; J. E. Ferris, Secretary and Treasurer. Selling agents, Corrigan, McKinney & Co., Perry-Payne Building, Cleveland, Ohio. (Formerly called Charlotte Furnace and owned by the Charlotte Iron Works.)—*Active in 1903.*

Franklin Furnace, Franklin Iron Manufacturing Company, Franklin Springs, Oneida county. Buffalo office, Ellicott Square. One stack, 70 x 15, built in 1871 and remodeled in 1883; idle for several years; operations resumed in 1899; fuel, ⅓ anthracite coal and ⅔ coke; ore, fossiliferous red hematite from Clinton, New York; product, foundry pig iron; annual capacity, 30,000 tons. Brand, "Franklin." A. E. Hedstrom, President, Buffalo, N. Y.; C. H. Smythe, Secretary, Clinton, N. Y.; W. A. Holden, Treasurer, Syracuse, N. Y.; T. B. Walker, Manager, Franklin Springs.—*Active in 1903.*

Lackawanna Furnaces, Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Furnaces at Lackawanna, Erie county. Three completed stacks and three stacks building; fuel, coke.—*For description see page 101.*

Niagara Furnaces, Tonawanda Iron and Steel Company, North Tonawanda, Niagara county. 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 and malleable pig iron; total annual capacity, 165,000 tons. Brands, "Niagara" and "Tonawanda Scotch." William A. Rogers, President; Archer Brown, Vice-President; William M. Mills, Treasurer; W. T. Shepard, Secretary; W. B. Kerr, Superintendent. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, St. Louis, Chicago, Pittsburgh, and Philadelphia.—*Active in 1903.*

Northern Furnace, Northern Iron Company, lessee, 600 Girard Trust Building, Philadelphia. Furnace at Port Henry, Essex county, New York. One stack, 70 x 17, built in 1872–3 and first put in blast August 12, 1875; four Whitwell stoves, each 22 x 30; fuel, anthracite coal and coke; ores, Old and New Bed Lake Champlain and Arnold mine hematite and magnetic; product, basic, malleable, foundry, and Bessemer pig iron; annual capacity, 55,000 tons. Brand, "Essex." Three of the Whitwell stoves are being replaced with three Cowper stoves, each 16 x

80; the fourth Whitwell stove is being raised to 50 feet. Theron I. Crane, President, and W. S. Pilling, Secretary and Treasurer, Girard Trust Building, Philadelphia. Selling agents, Pilling & Crane, Philadelphia. (Formerly called Cedar Point Furnace; owned by Witherbee, Sherman & Co., Incorporated.)—*Active in 1903.*

Poughkeepsie Iron Company, A. E. Tower, Agent and Treasurer, Poughkeepsie, Dutchess county. 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.—*Active in 1903.*

Number of mineral fuel furnaces in New York: 18 completed stacks and 3 stacks building. Of these 10 use coke alone and 3 coke furnaces are being built and 8 use anthracite coal and coke mixed.

CHARCOAL FURNACES—4.

Chatham Furnace, Union Iron and Steel Company, 71 Broadway, New York. Furnace at Chatham. One stack; fuel, charcoal.—*For description see page 105.*

Copake Iron Works, Copake Iron Company, lessee, 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, Duchess 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 iron for car wheels; annual capacity, 5,000 tons. Brand, "Copake." An iron foundry with an annual capacity of 500 tons is connected with the furnace. Arthur Gifford, President and Treasurer, and I. N. Collier, Vice-President, Hudson, N. Y.; W. A. Miles, Secretary and General Manager, Copake Iron Works. Selling agents, Rogers, Brown & Co., New York and branch houses. (Owned by W. A. Miles. Formerly operated by the Salisbury Carbonate Iron Company.)—*Active in 1903.*

Furnace C, The Buffalo Union Furnace Company, Buffalo. One stack; fuel, charcoal.—*For description see page 107.*

Standish Furnace, The Delaware and Hudson Company, Chateaugay Ore and Iron Department, Standish, Clinton county. One stack, built in 1886 and first blown in in February, 1887; origi-

nal size, 60 x 10½; abandoned in 1902, rebuilt in 1902-3, and blown in October 20, 1903; present size, 62½ x 12; fuel, charcoal; ore, concentrates; product, low-phosphorus pig iron; annual capacity, 35,000 tons. Brand, "Chateaugay." David Willcox, President; Abel I. Culver, Vice-President; Talbot Olyphant, Secretary; C. A. Walker, Treasurer; Harry R. Hall, Manager.—*Active in 1903. See Standish Iron Works, page 205.*

Number of charcoal furnaces in New York: 4 stacks.

Total number of furnaces in New York: 22 completed stacks and 3 building. Of these 10 use coke alone and 3 coke furnaces are being built, 8 use anthracite coal and coke mixed, and 4 use charcoal.

ROLLING MILLS AND STEEL WORKS—26 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Albany Iron and Steel Works Department, Continuous Rail Joint Company of America, Century Building, Newark, New Jersey. Works at Troy, Rensselaer county, New York. Established in 1819; 6 heating furnaces and 4 trains of rolls (one 9, one 14, and two 20-inch); product, bars, patented type continuous rail joints, and finger bars; annual capacity, 50,000 tons. Fuel, coal. Robert Gray, Jr., President, Fernando C. Runyon, Secretary and Auditor, Frederick T. Fearey, Managing Director and Treasurer, L. F. Braine, General Manager, and B. G. Braine, Engineer, Newark, N. J.; William J. Bradley, Superintendent of rolling mill, Troy, N. Y. (Formerly called the Albany Iron Works and owned by the Troy Steel Company.)

Astoria Steel Company, Calby M. Chester, Jr., Receiver, 44 Pine st., New York. Works at Astoria, Queens county. Built in 1900 and first steel made August 1, 1900; two 25-gross-ton basic open-hearth steel furnaces; product, steel castings; annual capacity, 30,000 tons. Fuel, oil. J. Frederic Kernochan, President; Thomas C. Clarke, Secretary and Treasurer; Thomas S. Blair, Jr., General Manager. (Plant formerly operated by the New York Steel and Wire Company and equipped with one blooming and one wire-rod mill, which were dismantled in 1903.)

Auburn Iron Works, C. W. Tuttle & Co., Auburn, Cayuga county. 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."

Breaker Island Works, American Steel and Wire Company of New Jersey, Chicago. Works on Breaker Island, N. Y.—*See page 43.*

Buffalo Steel Company, Tonawanda, Erie county. Built in 1900 and put in operation in August, 1900; one continuous heating

furnace and two 14-inch trains of rolls; product, light tee rails, (12, 16, 20, 25, and 30-pound,) Bessemer steel bars, angles, channels, tees, and special shapes for agricultural implements and other purposes; annual capacity, 10,000 tons of rails and 40,000 tons of other rolled products. Fuel, coal and coke. L. E. Block, President; J. H. Porter, Vice-President; J. G. Joseph, Secretary and Treasurer.

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo, Erie county. Two 15-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 6,000 tons. Fuel, producer gas. Malleable iron castings are also produced. O. P. Letchworth, President; W. C. Houck, Secretary; Josiah Letchworth, Treasurer; J. C. Bradley, Superintendent.

Burden Iron Works, The Burden Iron Company, Troy.—*For description see page 98.*

Chrome Steel Works, Brooklyn, Kings county. Main office and works, Kent ave. and Keap and Hooper sts. New York office, 11 Pine st. Built in 1869; 7 heating furnaces, 5 hammers, nine 6-pot crucible steel-melting holes, and 2 trains of rolls (one 12 and one 24-inch); 54 pots can be used at each heat in the steel works; product, tool steel and burglar-proof welded chrome steel and iron, 5-ply, for safes, jails, etc.; also adamantine shoes and dies for crusher stamp mills; also crucible chrome steel castings; annual capacity, 3,500 tons. Fuel, manufactured gas. Brands, "Adamantine" and "Chrome." Ferdinand E. Canda, President; Charles J. Canda, F. Mora Canda, and William Corry, Vice-Presidents; Charles A. Canda, Secretary; Thomas I. Jones, Treasurer.—*These works will probably be dismantled in the fall of 1904. See Chrome Steel Works in New Jersey, pages 207–8.*

Cohoes Rolling Mill, Cohoes Rolling Mill Company, Cortland and Canvass sts., Cohoes, Albany county. Built in 1854; burned and rebuilt in 1883; 11 double puddling furnaces, 4 scrap furnaces, (coal,) 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. George H. Page, President and Treasurer; Samuel T. Page, Vice-President; Albert W. Powers, Secretary. A plant for the manufacture of wrought-iron pipe is connected with these works; sizes, from ¼ of an inch to 2 inches inclusive; annual capacity, 25,000 tons.

Drew Steel Foundry, E. H. Drew, owner, Lockport, Niagara county. One crucible steel-melting furnace built in 1892 and first steel made in that year; number of pots, 4; product, steel cast-

ings; annual capacity, 100 tons. Fuel, coke. John Drew, Manager.

Eckels-Nye Steel Company, Syracuse, Onondaga county. 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. (Formerly operated by the Eckel Brothers Steel Company.)

Elmira Rolling Mill, Elmira Rolling Mill Company, Elmira. Works on Grand Central ave., Elmira Heights, Chemung county. Built in 1902 and first put in operation in September, 1902; 4 single puddling 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 stay-bolt iron; annual capacity, 15,000 tons. Fuel, bituminous coal. E. E. Buchanan, President; Irving D. Booth, Vice-President; Jesse L. Cooley, Secretary and Treasurer; Charles G. Phillips, General Manager.

Elmira Steel Works, E. B. Leaf & Co., Real Estate Trust Building, Philadelphia. Works at Elmira, Chemung county. 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 muck train of 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, 60,000 tons of bar, angle, and band iron, and 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."—*Idle and for sale or lease.*

Gould Coupler Company's Steel Plant, Gould Coupler Company, Depew, New York, and No. 1 West Thirty-fourth st., New York. Branch office, Rookery Building, Chicago. Works at Depew, Erie county. Built in 1903; 2 annealing furnaces and two 20-net-ton basic Wellman open-hearth steel furnaces with provision for two additional furnaces; first steel made November 21, 1903; product, all kinds of steel castings; present annual capacity, 30,000 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.

Hyle (The) Steel Tool Company, 100 South Salina st., Syracuse, Onondaga county. Building works to contain 4 special furnaces for the manufacture of steel castings for gearings, dies, wrenches, taps, reamers, and other steel tools; estimated annual capacity, 2,400 tons. Fuel, gas coal. Peter Eckel, President, C. K. Underwood, Vice-President, and Charles M. Bedell, Secretary, Syracuse; William H. Clarke, Treasurer, 154 Nassau st., and Charles Clarke Warren, Assistant Secretary, Tribune Building, New York. —*Will probably be completed and in operation in the fall of 1904.*

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; one 10 and two 8-gross-ton acid furnaces; annual capacity, single turn, 5,800 tons of open-hearth steel castings. One 2-gross-ton Tropenas converter added in 1903; first steel made June 1, 1903; 4 cupolas; product, general machinery castings and special electric metal of high permeability; annual capacity, 1,500 tons. Fuel, coal. Elias W. 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, Erie county.—*For description see pages 101–2.*

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.)

Onondaga Steel Works, Sweet's Steel Company, Syracuse, Onondaga county. Built in 1863 and enlarged several times; 9 heating furnaces, 3 hammers, (from 200 to 2,000 lbs. each,) and 4 trains of rolls (two 9 and two 12-inch); use Sweet's patent gas furnaces, burning semi-bituminous coal; manipulate old Bessemer steel rails and locomotive tires. One 12-gross-ton basic open-hearth steel furnace erected in 1899–1900 and first steel made in April, 1900; annual capacity, 10,000 tons of ingots.

Product, bar steel, steel crow-bars, tire and spring steel, and steel for various other purposes; annual capacity, 18,000 tons. Special products, "Sweet's Excelsior" tire steel, file steel, magnet steel, special analysis steel, special shapes, "Sweet's" steel crow-bars, "Sweet's" toe-calks, and "Favorite" toe-calk steel. Fuel, manufactured gas.—*Machinery will be dismantled in 1904 and removed to Newberry, near Williamsport, Pa., where the company is erecting a new plant. See Sweet's Steel Company, page 234, for a list of officers.*

Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 5 heating furnaces, 3 trains of rolls, (one 8 and two 10-inch finishing,) and one hammer; use scrap iron and steel billets; product, merchant bars of all sizes and shapes, part of which is used by the firm in the manufacture of agricultural machinery; annual capacity, 13,000 tons of rolled products and 3,500 tons of forged products. Fuel, bituminous coal. Contemplate erecting two 15-gross-ton basic open-hearth steel furnaces. T. M. Osborne, President; Edwin D. Metcalf, Vice-President and General Manager; J. H. Osborne, Secretary; C. F. Baldwin, Treasurer.

Poughkeepsie Works, Phoenix Horse Shoe Company, Rookery Building, Chicago. Works at Poughkeepsie, Dutchess county, New York. 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); specialty, horseshoes; annual capacity, 20,000 tons. Fuel, coal and manufactured gas. Brand, "Phoenix." Elisha H. Miller, President, A. E. Nusbaum, Treasurer, and S. H. Roberts, Secretary, Chicago; Thomas F. Hotchkiss, Purchasing Agent, Joliet, Illinois.—*See Joliet Works, pages 338–39.*

Rome Merchant Iron Mill, Rome, Oneida county. Boston office, Fitz Dana & Co., 110 North st. Built in 1869; 8 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best high grades of merchant puddled bars for forging and machine-shop work, and stay-bolt, engine-bolt, horseshoe, hexagon and beveled-edge, tire, screw, hoop, and band iron; special high-grade refined iron branded "Rome" and a superior quality branded "J. G."; annual capacity, single turn, 12,000 tons. Fuel, coal. Jim Stevens, President; S. B. Stevens, Vice-President; Charles W. Lee, Secretary and Treasurer.

Sanderson Brothers Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Syracuse, New York.—*For description see page 147.*

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, Niagara county. 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, Cortland county. 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; 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 Texas fuel oil. Chester F. Wickwire, President; E. Stilson, Secretary; Theo. H. Wickwire, Treasurer; A. F. Stilson, Superintendent; 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.

PROJECTED STEEL-CASTING PLANT—1.

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. Contemplates erecting one 2-gross-ton Tropenas steel converter in the summer of 1904; will probably be ready for operation in September, 1904; product, to be steel castings for ship work for the use of the Navy; annual capacity, about 1,200 tons. Fuel, coke.

Number of rolling mills and steel works in New York: 26 completed, one building, and one projected. Of these 2 have Bessemer steel plants, one makes Tropenas steel and one Tropenas steel plant is projected, 8 make open-hearth steel and one open-hearth steel plant is projected, 4 make crucible steel, and one plant for the manufacture of special steel is being built.

IRON-ORE FORGES AND SCRAP-IRON BLOOMARIES—2.

Sizer Forge Company, Buffalo. Built in 1872 and enlarged in 1900 and 1903; 10 heating furnaces and 7 steam hammers ranging

from 1,500 pounds to 6 tons; product, iron slabs made for sale from blooms and piled scrap; also iron and steel forgings; specialty, large or small cranks and shafts; annual capacity, from 5,000 to 6,000 tons. Fuel, coal. A machine shop is connected with the works. S. S. Sizer, President; H. S. Sizer, Vice-President and Treasurer; J. Y. Sloan, Secretary; W. S. Sizer, Manager.

Standish Iron Works, The Delaware and Hudson Company, Chateaugay Ore and Iron Department, Standish, Clinton county. Built in 1895; 18 fires and 3 hammers; product, charcoal blooms for general purposes and charcoal billets for crucible-steel melting stock of high grade, both made from Chateaugay concentrates; annual capacity, 6,000 tons. Fuel, charcoal. Selling agents, Pilling & Crane, Girard Trust Building, Philadelphia.—*See Standish Furnace, pages 198–99.*

Number of iron-ore forges and scrap-iron bloomaries in New York: 2.

NEW JERSEY.

COKE, MIXED ANTHRACITE AND COKE, AND ANTHRACITE FURNACES—12 COMPLETED AND 1 PROJECTED.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. One stack; fuel, coke, but occasionally some anthracite coal mixed with coke. Owned by Joseph Wharton.—*See page 109.*

Hackettstown Furnace, Carteret Steel Company, John S. Gibson, Receiver, 432 Prudential Building, Newark. Furnace at Hackettstown, Warren county. 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. (Formerly operated by the New Steel and Iron Company.)—*Last active in 1902. Idle and for sale or lease.*

Hudson County Furnace, The New Jersey Zinc Company, 71 Broadway, New York. Furnace in Hudson county, N. J. One stack; fuel, anthracite coal and coke.—*For description see page 108.*

Musconetcong Furnace, Musconetcong Iron Works, Stanhope, Sussex county. Executive office, Elizabeth, N. J. One stack, No. 2, 80 x 18, built in 1871 and rebuilt in 1900; 3 stoves (one Kent, one double Durham, and one single Durham) and one equalizer; fuel, anthracite coal and coke; ores, New Jersey magnetic, Lake Superior, Cuban, and other foreign; product, foundry and mill pig iron; annual capacity, 35,000 tons. Brand, "Musconetcong." E. H. Bennett, President, and T. T. Grover, Treasurer, Elizabeth; John S. Kennedy, Manager, Stanhope.—*Active in 1903.*

Newark Furnaces, The New Jersey Zinc Company, 71 Broadway, New York. Furnaces at Newark, N. J. Two stacks; fuel, anthracite coal and coke.—*For description see page 108.*

Oxford Furnace, Empire Steel and Iron Company, Catasauqua, Pa. Furnace at Oxford, Warren county, New Jersey. One stack; fuel, anthracite coal. A new furnace may be erected.—*For description see pages 111-12.*

Pequest Furnace, Pequest Company, 17 Burling Slip, New York. Furnace at Buttzville, Warren county. One stack, 67 x 16, built in 1874 and rebuilt in 1883; Durham iron pipe stoves; fuel, ⅞ anthracite coal and ⅛ Connellsville coke; ores, New Jersey magnetic and manganiferous; product, gray forge and basic pig iron; annual capacity, 25,000 tons. Brand, "Pequest." James O. Green, President, Peter Cooper Hewitt, Vice-President, Erskine Hewitt, Secretary, and Edward R. Hewitt, Treasurer, 17 Burling Slip, New York; Robert L. Ahles, General Manager, Buttzville, New Jersey. Sales made by the company at 17 Burling Slip, New York. (Owned by the Hewitt Estate.)—*Active in 1903.*

Secaucus Furnace, Eastern Iron Company, lessee, 39 Cortlandt st., New York. Furnace at Secaucus, Hudson county; telegraph address, Rutherford, Bergen county. One stack, 65 x 18, 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, local and Gouverneur and Port Henry from New York; product, foundry pig iron; annual capacity, 27,000 tons. Brand, "Secaucus." Chase Andrews, President, and J. M. Clark, Treasurer, New York; Albert Trinler, General Manager, Secaucus. (Formerly operated by the Secaucus Iron Company. Owned by the Hackensack Meadows Company, New York.)—*Active in 1903.*

Wharton Furnaces, Joseph Wharton, owner, Philadelphia. Furnaces at Wharton, N. J. Three stacks; fuel, coke, but occasionally some anthracite coal mixed with coke.—*For description see page 109.*

Number of furnaces in New Jersey: 12 completed and one projected. Of these 6 use mixed anthracite coal and coke, 5 use coke, one uses anthracite coal alone, and one furnace to use anthracite coal alone is projected. There are no charcoal stacks in New Jersey.

ROLLING MILLS AND STEEL WORKS—23 COMPLETED AND 1 PROJECTED.

American Horse Shoe Company, Phillipsburg, Warren county. Built in 1865; 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; annual capacity, 10,000 tons.

Fuel, coal. Brand, "American." Charles H. Holton, President; Philip S. Dyer, Secretary and Treasurer. (Formerly called the Delaware Rolling Mill.)

American Sheet Iron Works, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1867; enlarged in 1870, 1873, 1882, and 1892; one double puddling furnace, 2 heating furnaces, 3 sheet-finishing furnaces, one pair furnace, 4 annealing furnaces, one 22-inch muck mill, one 22-inch bar mill, three 22 x 44-inch sheet mills, all hot, two 22 x 26-inch cold mills, one rotary squeezer, and one hammer; product, best qualities of sheet iron and sheet steel for stamping and enameling; annual capacity, triple turn, 4,000 tons. Fuel, anthracite and bituminous coal. Brand for sheets, "American R. G. Cleaned." Walter C. Harris, President; George Danby, Secretary and Treasurer; Mark Danby, Superintendent. Sales made by the company.

Atha (Benjamin) & Co., Newark, Essex county. Began operations in 1864; 2 open-hearth steel furnaces (one 15-gross-ton acid and one 15-gross-ton basic); first acid open-hearth steel made in 1879 and first basic open-hearth steel made in 1898; product, steel castings; annual capacity, 5,000 tons of acid and 4,000 tons of basic castings. Bessemer steel department added in 1901 and first steel made in September, 1901; three 1½-gross-ton top-blown Bessemer converters; product, steel castings; annual capacity, 2,500 tons. Fuel, oil, coal, and manufactured gas. Benjamin Atha, President; Henry G. Atha, Vice-President; Abram C. Denman, Secretary; Herbert B. Atha, Treasurer and General Manager.

Atha Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Harrison, Hudson county, New Jersey.—*For description see page 144.*

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton, Morris county. Built originally in 1825 and enlarged since; 9 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 9, one 16, and one 18-inch); product, bar iron and angles; annual capacity, 16,000 tons. Fuel, bituminous coal. Brand, "Boonton." Charles Brock, President; R. A. Anthony, Vice-President; F. A. Anthony, Secretary; A. P. Smith, Treasurer. (Owned by the Estate of J. Couper Lord; Benjamin Nicoll, Secretary, 59 Wall st., New York.)

Chrome Steel Works, Chrome, Middlesex county. 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, one 12-inch bar mill, and one 112-inch and one 72-inch plate and angle mill;

product, chrome steel plates, angles, and bars; sizes of angles, 3, 4, 6, and 8-inch; annual capacity, 60,000 tons. Two 15-gross-ton Siemens acid open-hearth steel furnaces; first steel made March 19, 1904; product, ingots and castings; annual capacity, 20,000 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.—*For list of officers see Chrome Steel Works in New York, page 200.*

Delawanna Foundry, The Cooper, Wigand, Cooke Company, 152 West Thirty-fourth st., New York. Works at Delawanna, Passaic county, New Jersey. Built in 1903 and first put in operation in October, 1903; one 20-gross-ton basic open-hearth steel furnace; product, steel ingots and castings; annual capacity, 24,000 tons. Fuel, gas from gas coal. Also operates a bridgebuilding plant at Newark. John Cooper, President; John K. Cooke, Vice-President; Albert A. Wigand, Treasurer; E. P. Cooke, Secretary, O. W. Cooke, General Manager of Foundry. Selling agents for New England, F. D. Moffat & Co., 81 Fulton st., New York.

Heller Brothers Company, Newark, Essex county. 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, 4 hammers, (one ¼, one ½, one 2, and one 3-ton,) and one 10-inch train of rolls; product, clay crucible steel, made into rasp, file, and high-grade tool steel; annual capacity, single turn, 2,000 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.

Janson Steel and Iron Company, Oxford, Warren county. Original works built in 1866 and rebuilt in 1900; 16 puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 12 and two 22-inch); product, bar iron and steel; annual capacity, 20,000 tons. Fuel, bituminous coal. Joseph Janson, President; Val. Janson, Secretary and Treasurer; Frank Janson; Manager.

Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City, Hudson county. 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, rivets, and round, flat, and square bar iron; annual capacity, 10,000 tons. Fuel, producer gas.

Ludlum (The) Steel and Spring Company, Pompton, Passaic county. 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." H. A. Peckham, President; James W. Cox, Jr., Vice-President; William E. Ludlum, Secretary and Treasurer.

New Jersey Steel Company, Rahway, Union county. 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 two 4,000-pound Evans-Wills converters; product, high-grade steel castings; annual capacity, 5,000 tons. Fuel, coke, fuel oil, and coal. Adding one 20-gross-ton acid open-hearth steel furnace. C. E. Finley, President; A. E. Williamson, Secretary; A. W. McArthur, Treasurer and General Manager.

Pardee (The C.) Works, Incorporated, Perth Amboy, Middlesex county. Built in 1900 and put in operation December 1, 1900; one heating furnace and one 12-inch train of rolls with one set of 14-inch roughing rolls; product, steel merchant bars; annual capacity, single turn, 12,000 tons. Two 25-gross-ton basic open-hearth steel furnaces built in 1903; 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; Samuel B. Morgan, Vice-President and Treasurer; Charles F. Eilert, Secretary.

Passaic Steel Company, Paterson, Passaic county. New York office, Hanover Bank Building, 5 Nassau street; Boston office, 31 State street. Works built in 1867 and greatly enlarged in 1902–3; Passaic Rolling Mill Company incorporated in 1869 and Passaic Steel Company incorporated in 1902. Seven open-hearth steel furnaces, (two 50 and four 25-gross-ton basic and one 25-gross-ton acid,) one 3-hole and two 2-hole soaking pits, and 8 Duff gas producers; 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, 10,000 tons of acid and 115,000 tons of basic ingots and castings; one blooming mill, shears, hydrau-

lic machinery, and electric crane for operating soaking pits and delivering ingots to blooming mill tables; 4 double gas puddling furnaces, 7 gas heating furnaces, one Laughlin furnace, and 6 trains of rolls (one puddle, and one 9, one 18, 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, tees, universal mill plates, and merchant bars; annual capacity, 100,000 tons of finished products. Fuel, manufactured gas. Brand, "Passaic." The plant includes a bridge department with a modern outfit, including a steel eyebar plant; annual capacity of bridge shop, 12,000 tons. A. C. Fairchild, President; F. F. Searing, Vice-President; J. B. Cooke, Secretary and Treasurer; John K. Cooke, General Manager; George H. Blakeley, Chief Engineer. (Formerly called the Passaic Rolling Mills and Bridge Works and operated by the Passaic Rolling Mill Company.)

Rockaway (The) Iron and Steel Company, Rockaway, Morris county. Built in 1900–1 and first put in operation in May, 1901; 4 busheling furnaces, 2 heating furnaces, and 3 trains of rolls (one 10, one 12, and one 18-inch); product, merchant bars; annual capacity, 10,000 tons. Fuel, bituminous coal. Brand, "Rockaway." Edward Ehlers, President; Allen D. Forrester, Treasurer.

Roebling's (John A.) Sons Company, Trenton, Mercer county. Branch stores, 117 Liberty st., New York; 173 Lake st., Chicago; 27 Fremont st., San Francisco. 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. In addition to the iron and steel wire department the works consist of a wire-rope and cable department, a wire-cloth department, a barb-wire, a copper wire, and an insulated wire and cable department. Annual capacity for iron, steel, and copper wire, 65,000 tons; of rolling mill, 45,000 tons of wire rods. Fuel, manufactured gas and coal. Charles G. Roebling, President; Washington A. Roebling, Vice-President; Ferdinand W. Roebling, Secretary and Treasurer.

Singer (The) Manufacturing Company, Elizabeth, Union county. This company erected a rolling mill and a wire-drawing plant at Elizabethport in 1903; it consumes in its own works all the rolled and drawn products made; it declines to give a detailed description of its equipment and products.

Taylor Iron and Steel Company, High Bridge, Hunterdon county. 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 pud-

dling 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 steel added in 1892 and first steel made in September, 1892; product, Hadfield's manganese, nickel, chrome, and other steel castings, including armor-piercing projectiles of large and medium calibre. Fuel, coal and coke. Lewis H. Taylor, President; Robert E. Jennings, Vice-President; T. F. Budlong, Secretary and Treasurer; Walter Gaston, General Manager; Percival Chrystie, Superintendent.

Tremley Point Plant, American McKenna Process Company, Colby and Abbot Building, Milwaukee, Wisconsin. Works at Tremley Point, Union county, New Jersey. 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. Howard Morris, President, C. M. Morris, Secretary, and E. J. Tapping, Treasurer and General Manager, Milwaukee, Wisconsin; Julian L. Yale, Vice-President, Monadnock Building, Chicago; D. H. Lentz, General Superintendent, Joliet, Illinois.—*See Joliet Plant, page 338.*

Trenton (The) Iron Company, Trenton, Mercer county. New York office, 17 Burling Slip. Built in 1845; 3 heating furnaces, one 3-ton hammer, one 12-inch train of rolls, and one wire-rod mill, consisting of two 12 and two 10-inch trains; wire works contain 500 blocks; operates several trains of cold rolls for rolling round wire into flat wire; product, wire rods, merchant rods, iron and steel wire, cold-rolled steel, wire rope, and wire-rope tramways (Bleichert system) for the transportation of material; annual rod capacity, 18,000 tons. Fuel, coal and producer gas. Edward Cooper, President, and Erskine Hewitt, Vice-President, New York; Charles E. Hewitt, Treasurer and General Manager, and Eagleton Hanson, Secretary, Trenton.

Ulster Iron Works, Dover, Morris county. New York office, 139 Greenwich st. 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. (Formerly called the Dover Iron Works.)

West Bergen Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Jersey City.—*For description see page 147.*

West Jersey Tube Works, 305 Drexel Building, Philadelphia. Works at Bridgeton, Cumberland county, New Jersey. 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 ⅛ of an inch to 2 inches inclusive. Fuel, bituminous coal and oil. (The cut-nail machines formerly in these works have been dismantled. Formerly called the Cumberland Nail and Iron Works.)

PROJECTED CEMENTATION FURNACE—1.

Devlin (Thomas) Manufacturing Company, American st. and Lehigh ave., Philadelphia. Works at Burlington, Burlington county, New Jersey. Built in 1902–3 and first put in operation August 17, 1903; 6 annealing furnaces; product, malleable castings. Will add one cementation furnace for the treatment of malleable castings; also 2 annealing furnaces. Fuel, anthracite and bituminous 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: 23 completed and one projected. Of these 2 make steel in Bessemer converters, (one top-blown and one Evans-Wills,) 5 make open-hearth steel and one open-hearth steel plant is being built, 5 make crucible steel, one makes special steel, and one plant to treat 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—10.

Davis Brothers Rolling Mill and Spike Works, Davis Brothers, Twenty-ninth and Bristol sts., Philadelphia. Post-office address, station "Z." Built in 1900 and first put in operation in June, 1900; one forge fire, 3 heating furnaces, 3 trains of rolls, (one 18-inch break down, one 10-inch roughing, and one 8-inch finishing,) and 8 spike machines; product, small angles and square rods, the latter used in the manufacture of wrought-iron railroad, ship, bridge, and wharf spikes; annual capacity, 10,000 tons of finished products. Fuel, anthracite and bituminous coal. Charles Gibbons Davis, Manager and Owner.

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 Best." Ishmael James, Superintendent.

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot crucible steel-melting furnaces, and 3 hammers; product, frog plates and points, all kinds of steel forgings, and best American cast steel, suitable for shear knives, dies, lathe tools, etc.; annual capacity, single turn, 450 tons. Fuel, coal.

Frankford Steel Company, lessee, 20 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 2 hammers (one 800 and one 1,250-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 present 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, "Frankford." Charles T. Evans, Receiver and General Manager; Dudley G. Gautier, President; William C. Pearson, Vice-President · Henry A. Bugie, Secretary and Treasurer. Selling agents, D. G. Gautier & Co., 20 Cliff st., New York. (Formerly called the Oxford Iron and Steel Works and operated by William & Harvey Rowland, Incorporated.)

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. 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. 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 Hat-

field, Vice-President and Treasurer.—*See Tinplate and Terne Plate Works, (Philadelphia Iron and Tinplate Works.)*

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons Iron and Steel Works, Tacony, Philadelphia. Address all communications to post-office box 1537, Philadelphia.—*See page 113.*

Midvale (The) Steel Company, Nicetown, Philadelphia. This company declines to give a description of its works for publication in the Directory. It manufactures crucible and open-hearth steel ingots and castings; also hammered car axles, steel gun forgings, and other forms of rolled and forged finished steel products. It is also building an armor-plate plant.

Philadelphia Steel and Iron Company, Trenton ave. and Margaret st., Frankford, Philadelphia. Philadelphia office, 1529 Real Estate Trust Building; New York office, 74 Broadway. Built in 1880 and enlarged in 1895; one 20,000-lb. special furnace for the manufacture of "Atlas" 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, nickel-steel castings for railroad, automobile, and steamship bearings. Fuel, coal. J Wesley Allison, President, and G. H. Meldrum, Secretary and Treasurer, New York; Alfred C. Rex, Vice-President and General Manager, Philadelphia.

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; product, steel castings, chiefly consumed by the firm in their switch works; annual capacity, 2,000 tons. Fuel, coke. William Wharton, Jr., President; Victor Angerer, Vice-President; Richard Ashhurst, Secretary and Treasurer; L. Koppenhoefer, Assistant Secretary; William Selfridge, Assistant Treasurer.

Number of rolling mills and steel works in Philadelphia city and county: 10. Of these 2 make open-hearth steel, 5 make crucible steel, one makes Tropenas steel, and one makes special steel.

There are no blast furnaces in Philadelphia city or county.

LEHIGH VALLEY.

Embraces Blast Furnaces, Rolling Mills, and Steel Works located in Northampton, Lehigh, Carbon, and Bucks Counties.

ANTHRACITE AND MIXED ANTHRACITE AND COKE FURNACES—29 COMPLETED AND 1 PARTLY ERECTED.

Allentown Iron Company, 106–8 South Fourth st., Philadelphia. Furnaces at Allentown, Lehigh county. Two stacks: No. 4, 60

x 16½, built and blown in in 1886, and No. 5, 60 x 17, built in 1872 and blown in in 1873; fuel, anthracite coal and coke; ores, New York, New Jersey, Pennsylvania magnetic, Lake Superior, and local hematite; product, foundry, forge, and basic pig iron; total annual capacity, 60,000 tons. Lewis A. Riley, President, C. F. Howell, Vice-President, and H. F. Baker, Treasurer, Philadelphia. (Formerly operated by the Allentown Iron Works; later by the Crane Iron Works.)—*Active in 1903. For sale or lease.*

Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Works at Allentown, Lehigh county. 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.—*Active in 1903. See The Allentown Rolling Mills, page 217.*

Bethlehem Furnaces, Bethlehem Steel Company, South Bethlehem, Northampton county. Four completed stacks and one stack partly erected; fuel, anthracite coal and coke. Controlled by the United States Shipbuilding Company, New York.—*See pages 90–1.*

Carbon Iron Works, Carbon Iron and Steel Company, Limited, Mauch Chunk. Works at Parryville, Carbon county. One stack, 66 x 15, built in 1869 and blown in in 1870; rebuilt in 1894–5 and 1898; three 18 x 65 Foote brick stoves; fuel, anthracite coal and coke; ores, magnetic from New Jersey and Lake Champlain and Lake Superior and foreign; annual capacity, 38,000 tons; product, "Carbon" foundry iron, "Parry" Bessemer iron, and "Viking" low-phosphorus iron. M. S. Kemmerer, Chairman, and H. A. Butler, Secretary and Treasurer, Mauch Chunk; S. S. Freeman, Superintendent, Parryville. Sales made by the company.—*Active in 1903.*

Crane Furnaces, Crane Iron Works, Catasauqua, Lehigh county. Four stacks; fuel, anthracite coal and coke. Controlled by the Empire Steel and Iron Company.—*For description see page 111.*

Crumwold Furnace Department, Reading Iron Company, Reading. Furnace at Emaus, Lehigh county. One stack; fuel, anthracite coal and coke.—*For description see pages 124–25.*

Durham Iron Company, Riegelsville, Bucks county. One stack, 75 x 16⅔, 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; iron actually made in one calendar year, 38,525 tons. Brand, "Durham." Julius Christinsen, President,

926 Drexel Building, Philadelphia; John Jameson, Vice-President, Riegelsville, Pa.; James H. Morris, Secretary and Treasurer, Drexel Building, Philadelphia; John D. Thomas, Superintendent, Riegelsville. (Formerly called the Durham Iron Works.)—*Active in 1903.*

Hokendauqua Furnaces, The Thomas Iron Company, Easton. Furnaces at Hokendauqua, Lehigh county. Four stacks; fuel, mixed anthracite coal and coke.—*For description see page 114.*

Keystone Furnace, The Thomas Iron Company, Easton. Furnace at Island Park, Northampton county. One stack; fuel, mixed anthracite coal and coke.—*For description see page 114.*

Lehigh Iron and Steel Company, Allentown, Lehigh county. 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; closed tops and fronts; 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." W. H. Ainey, President; F. J. Remmel, Secretary. (Formerly called the Lehigh Steel and Iron Company.)—*Active in 1903.*

Lock Ridge Furnaces, The Thomas Iron Company, Easton. Furnaces at Alburtis, Lehigh county. Two stacks; fuel, anthracite coal.—*For description see page 115.*

Macungie Furnace, Empire Steel and Iron Company, Catasauqua. Furnace at Macungie, Lehigh county. One stack; fuel, anthracite coal and coke.—*For description see page 111.*

Palmerton Furnace, The New Jersey Zinc Company (of Pa.), South Bethlehem. Furnace at Palmerton, Carbon county. One stack; fuel, anthracite coal and coke. Controlled by the New Jersey Zinc Company.—*For description see page 108.*

Saucon Furnaces, The Thomas Iron Company, Easton. Furnaces at Hellertown, Northampton county. Two stacks; fuel, mixed anthracite coal and coke.—*For description see page 115.*

South Bethlehem Furnace, The New Jersey Zinc Company (of Pa.), South Bethlehem, Northampton county. One stack; fuel, anthracite coal and coke. Controlled by the New Jersey Zinc Company.—*For description see page 108.*

Number of furnaces in the Lehigh Valley: 29 completed and one partly erected. Of these 25 use anthracite coal and coke mixed and 4 use anthracite coal alone. When completed the partly-erected stack will probably use anthracite and coke mixed.

ROLLING MILLS AND STEEL WORKS—10.

Adams Crucible Steel Works, Adams Crucible Steel Company, 149 Broadway, New York. Works at Redington, Northampton coun-

ty, Pa. 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. One 3-high 10-inch train of rolls may be added. Henry H. Adams, President; J. D. Barrett, Vice-President; C. M. Smith, Secretary; H. H. Adams, Jr., Treasurer; W. L. Bechtold, General Manager. Sales made by the company.

Allentown (The) Rolling Mills, 225 Drexel Building, Philadelphia. Works at Allentown, Lehigh county. Built in 1860; 2 single and 8 double puddling furnaces, 4 heating furnaces, (2 coal and 2 fuel oil,) and 3 trains of rolls (one 18-inch muck, one 16-inch bar and shape, and one 10-inch rod and small angle); product, iron angles, merchant bars, machinery, bridge work, and mine and flat cars; annual capacity, 10,000 tons. Brand, "A. R. M." Fuel, coal and oil. An active machine shop and an active gray iron foundry are connected with the works. H. M. Howe, President, 225 Drexel Building, Philadelphia; H. W. Allison, Secretary, Treasurer, and General Manager, Allentown.—*Rolling Mill idle since 1895. See Blast Furnaces, page 215.*

Allentown Works, American Steel and Wire Company of New Jersey, Chicago. Works at Allentown.—*For description see page 42.*

Bethlehem Steel Works, Bethlehem Steel Company, South Bethlehem, Northampton county. Controlled by the United States Shipbuilding Company, New York.—*For description see pages 91-2.*

Bristol Rolling Mill, Consolidated Iron and Steel Company, Bristol, Bucks county. Philadelphia office, Bullitt Building. Built in 1875-6; 2 double and 4 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 18-inch 3-high muck, with coffee mill squeezer, and one 8 and one 12-inch finishing); product, bar, band, hoop, and scroll iron, and cotton-ties; annual capacity, 12,000 tons of finished iron. Fuel, bituminous coal. Brand, "Bristol." J. McGregor Gibb, President; Andrew G. Curtin, Jr., Secretary; Conrad S. Grove, Treasurer; H. H. Seidel, General Manager. Selling agents, L. & R. Wister & Co., 672 Bullitt Building, Philadelphia.

Bryden Horse Shoe Works, Bryden Horse Shoe Company, Catasauqua, Lehigh county. Organized in 1882; rolling mill department added in 1889-90 and first put in operation in April, 1890; 3 heating furnaces and 3 trains of rolls (two 9 and one 10-inch); press and forge departments contain 12 heating furnaces, 10 benders, 10 presses, four 1,200-lb. hammers, and trimming, clipping, punching, and cleaning machinery; 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; annual capacity, single turn, 6,000 tons. Fuel, bituminous coal. Oliver Williams, President and Treasurer; George E. Holton, Vice-President; T. F. Frederick, Secretary; Jacob Roberts, Superintendent.

Catasauqua Steel Works, Mrs. Emma L. Johnson, Catasauqua. Works at West Catasauqua, Lehigh county. Built in 1877 and first put in operation in that year; one heating furnace, 2 annealing furnaces, one 12-inch train of hot rolls, and 5 stands of 9-inch cold 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, coal. (Formerly operated by George Johnson.)

Easton Sheet Iron Works, Jackson Rolling Mill Company, Easton, Northampton county. Started February 1, 1872; one single and one double puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and 2 trains of rolls (one 22-inch bar and one 22-inch sheet); product, steel and refined sheets; annual capacity, 1,500 tons. Fuel, coke and bituminous coal. Brand, "Jackson Polished." J. R. Jackson, President and Treasurer; J. R. Jackson, Jr., General Manager and Secretary. (Formerly operated by Theodore Oliver.)

Slatington Rolling Mill, Slatington Rolling Mill Company, Slatington, Lehigh county. 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; annual capacity, 7,500 tons. Fuel, bituminous coal. Brands, "Slatington," "Slatington D. R.," "Slatington S. B.," "Slatington Special," and "Slatington Norway." Edward Edwards, President and Business Manager; S. DeLong, Secretary and Treasurer; Lewis P. Hopkins, Superintendent.

Sterlingworth Railway Supply Company, North American Building, Philadelphia. Works at Easton, Northampton county. 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, bituminous coal. Also makes air furnace and malleable iron castings. F. W. Coolbaugh, President; W. J. Kuebler, Vice-President; James R. Zearfoss, Treasurer; Jesse R. Lerch, Secretary.

Number of rolling mills and steel works in the Lehigh Valley: 10. Of these one makes open-hearth steel, 2 make crucible steel, and 2 treat steel by the cementation process.

SCHUYLKILL VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Pig and Scrap Iron Bloomaries in Montgomery, Berks, and Schuylkill Counties; also in parts of Chester and Lebanon Counties.

COKE AND MIXED ANTHRACITE COAL AND COKE FURNACES—16.

Anvil Furnace, Glasgow Iron Company, Pottstown. One stack; fuel, anthracite coal and coke.—*For description see pages 126-27.*

Henry Clay Furnaces, Empire Steel and Iron Company, Catasauqua. Furnaces at Reading. Two stacks; fuel, anthracite coal and coke.—*For description see page 111.*

Keystone Furnace Department, Reading Iron Company, Reading. Furnace at Reading. One stack; fuel, anthracite coal and coke. —*For description see page 125.*

Keystone Furnaces, The E. and G. Brooke Iron Company, Birdsboro, Berks county. Two stacks: one, 57 x 15, built in 1871, and one, 66 x 15¼, built in 1873; three Durham and three Whitwell hot-blast stoves; fuel, anthracite coal and coke; ores, magnetic, with a large mixture of hematite; product, basic open-hearth, foundry, and forge pig iron; total annual capacity, 65,000 tons. Brand, "Brooke." Cyrus G. Henry, Superintendent. Selling agents, Pilling & Crane, Girard Building, and J. J. Mohr, Bullitt Building, Philadelphia.—*Active in 1903. See Birdsboro Nail Works, page 221.*

Leesport Furnace, Leesport Furnace Company, Leesport, Berks county. 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 agent, J. J. Mohr, Bullitt Building, Philadelphia.—*Active in 1903.*

Robesonia Furnace, Robesonia Iron Company, Limited, Robesonia, Berks county. One stack, 80 x 18, built in 1855, enlarged in 1873, and rebuilt in 1885; four Whitwell stoves; fuel, coke; ore, Cornwall exclusively; product, Bessemer and low-phosphorus pig iron; annual capacity, 55,000 tons. Brand, "Robesonia." William R. White, Chairman, 1016 Stephen Girard Building, Philadelphia; Howard C. Shirk, Secretary, Lebanon; S. H. Chauvenet, Manager, Robesonia. Selling agents, J. Tatnall Lea & Co., Stephen Girard Building, Philadelphia.—*Active in 1903.*

Sheridan Furnaces, Pennsylvania Furnace Company; principal office, 60 State st., Boston, Mass. Furnaces at Sheridan, Lebanon

county, Pa. Two stacks: No. 1, 78 x 15, built in 1862 to use charcoal and changed to anthracite in 1867; iron stoves; No. 2, 75 x 16, built in 1874–5 and rebuilt in 1891; three fire-brick stoves; fuel, anthracite coal and coke; ores, Cornwall local hematite and Lake Superior; product, Bessemer, basic, and foundry pig iron; total annual capacity, 60,000 tons. Brands, "Sheridan" for Bessemer and "Vulcan" for foundry iron. John Reed, President; J. A. Coram, Vice-President; T. E. Hopkins, Treasurer. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.—*Last active in 1902.*

Swede Furnaces, Richard Heckscher and Sons Company, Swedeland, Montgomery county. Main office, Manhattan Building, Philadelphia. Two stacks: No. 1, built in 1850 and rebuilt in 1881, 1887, 1897, and 1899; present size, 80 x 17; No. 2, 80 x 16½, built in 1890–1 and enlarged in 1899; 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; fuel, anthracite coal and 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, 80,000 tons; No. 2, 60,000 tons. Brand, "Swede." Equipped with one Uehling pig-iron casting machine and conveyor. Austin Heckscher, President; Maurice Heckscher, Secretary and Treasurer; Ledyard Heckscher, General Manager; G. A. Heckscher, Assistant General Manager; P. Johnson, Superintendent. Selling agents for New York and New England only, John W. Quincy & Co., New York.—*Active in 1903.*

Temple Furnace, Temple Iron Company, Reading. Furnace at Temple, Berks county. One stack, 75 x 15, built in 1867 and rebuilt in 1875; three Durham stoves; fuel, anthracite coal and coke; ores, Lake Superior and local hematite and New Jersey magnetic; 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, Scranton.—*Active in 1903.*

Topton Furnace, Empire Steel and Iron Company, Catasauqua. Furnace at Topton, Berks county. One stack; fuel, anthracite coal and coke.—*For description see page 112.*

Warwick Furnaces, Warwick Iron and Steel Company, Pottstown, Montgomery county. Philadelphia office, 619 Girard Building. 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

21, built in 1900–1 and first blown in October 8, 1901; four Cowper-Roberts stoves, each 100 x 21; fuel, ¼ anthracite coal and ¾ coke; ores, New Jersey and New York magnetites and Lake Superior; specialties, sandless lake ore foundry, neutral mill, and basic pig iron; total annual capacity, 185,000 tons. Brand, "Warwick." Equipped with two pig-iron casting machines. Edgar S. Cook, President and General Manager; G. W. Nicolls, Secretary and Treasurer. Selling agents: for mill iron exclusively without regard to territory and for foundry iron in Philadelphia and its immediate vicinity, J. Wesley Pullman, 238 South Third st., Philadelphia; for foundry and basic iron, Pilling & Crane, Girard Building, Philadelphia; for foundry iron in New York and New England, C. L. Peirson & Co., Boston.—*Active in 1903.*

Number of furnaces in the Schuylkill Valley: 16. Of these 15 use anthracite coal and coke mixed and one uses coke alone.

ROLLING MILLS AND STEEL WORKS—31.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 16 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, 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.—*See Keystone Furnaces, page 219.*

Blandon Rolling Mill, Simon Seyfert, Blandon, Berks county. Built in 1867 and enlarged and improved in 1880, 1887, 1890, 1891, and 1892; one single and 6 double puddling furnaces, 4 heating furnaces, rotary squeezers, 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 224.*

Brylgon Steel Casting Company, Reading, Berks county. One 2-gross-ton Bookwalter steel converter built in 1901 and first blow made May 1, 1901; product, steel castings from one pound to any desired weight; annual capacity, 3,000 tons. Fuel, coke. (Formerly operated by the Brylgon Foundry.)—*This company is erecting a new plant at New Castle, Delaware. When it is completed the Reading plant will be abandoned. See page 274 for a list of officers.*

Carpenter Steel Company, Reading, Berks county. Sales office, No. 1 Broadway, New York. 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,) 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, wire, etc., and forgings and armor-piercing projectiles; annual capacity, 9,000 tons of crucible steel ingots and 25,000 tons of rolled and forged products. Fuel, bituminous coal. The company also operates a machine shop and cold-rolling and wire-drawing plants. Robert E. Jennings, Receiver.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. Built in 1832, 1852, and 1864 respectively; rebuilt in 1882–3; 7 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, sheet, flue, and plate iron of all kinds; corrugated iron a specialty; annual capacity, 20,000 tons. Fuel, bituminous and anthracite coal. Brands, "Blue Annealed" iron and steel, "Hope," "Anchor," "R. G.," "Special Electric," "Best Bloom," and "Soft Steel." 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 street, New York.

Delaware Seamless Tube Company, Auburn, Schuylkill county. Rolling mill for the manufacture of blanks for seamless tubes added to a bolt and nut plant in 1897 and first rolled blanks produced 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 12-inch); product, hollow seamless billets, boiler tubes, hollow stay-bolt 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. (Formerly called the Auburn Works and operated by the Shelby Steel Tube Company.)

Diamond Drill and Machine Company, Birdsboro, Berks county.

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. George Brooke, President; Robert E. Brooke, Vice-President; D. Owen Brooke, Secretary and Treasurer; W. Elliston Farrell, Manager.

Douglassville (The) Iron Company, Limited, Douglassville, Berks county. 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.

Eastern (The) Steel Company, Pottsville, Schuylkill county. 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 one 32-inch blooming mill, 3 soaking pits, and one 12 and one 19-inch structural mill; one 28-inch structural mill is being added; product, blooms and billets for the company's use and for sale; also steel beams, channels, angles, tees, bars, and shafting; 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; 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., Vice-President; Edward L. Herndon, Secretary; Peter R. Foley, Treasurer. (Formerly called the Pottsville Rolling Mills.)

Ellwood Ivins, 487 Broadway, New York. Works at Oak Lane Station, Montgomery county, 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.

Exeter Rolling Mill, Exeter Iron Company, 1242 Real Estate Building, Philadelphia. Works at Reading, Berks county. Built in

1892 and first put in operation in March, 1893; 4 heating furnaces, 2 trains of rolls, (one 14-inch skelp and one 14-inch socket and bar,) and 2 hammers (one 1,000-lb. and one 3,000-lb.); product, skelp, socket, and bar iron; annual capacity, 15,000 tons. Fuel, bituminous coal. E. B. Leaf, President; G. Herbert Leaf, Treasurer. Selling agents, E. B. Leaf & Co., Real Estate Trust Building, Philadelphia.

Gibraltar Iron Works, Simon Seyfert, Reading, Berks county. Built in 1846 and rebuilt in 1883–4; 4 heating furnaces and two 19-inch trains of 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 221.*

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown. —*For description see page 127.*

Glendale Mill, Lucknow Iron and Steel Company, lessee, Harrisburg. Works at Pine Iron Works P. O., Berks county; 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. James B. Bailey, President; H. L. Champlain, Secretary and Treasurer; Joseph Bailey, Manager of Mill. (Owned by the Pine Iron Works Company.)—*See Lucknow Forge, page 239.*

Hoopes and Townsend Company, post-office station S, Philadelphia. Works at Hoopeston, Montgomery county. Built in 1901 and first put in operation October 16, 1901; 2 puddling furnaces, 6 busheling furnaces, 6 heating furnaces, and 3 trains of rolls (9, 12, and 20-inch); product, bar iron and steel consumed by the company in the manufacture of bolts, nuts, washers, and boiler, sheet, and tank rivets; annual capacity, about 25,000 tons of bars. Fuel, coal. A machine shop is connected with the works. The bolt, nut, and rivet works of the company are located at 1330 Buttonwood st., Philadelphia. Clement R. Hoopes, President; Barton Hoopes, Jr., Vice-President; James M. Hibbs, Secretary; John M. Zook, Treasurer; Dawson Hoopes, Manager.

Ivy Rock Steel Works, Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia. Works at Ivy Rock, near Conshohocken, Montgomery county.—*For description see page 131.*

Keystone Nail Works, Ellis and Lessig Steel and Iron Company, Limited, Pottstown, Montgomery county. 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, 27,000 tons of muck bar, 14,500 tons of tack, nail, and shovel plate, and 300,000 kegs of cut nails. Fuel, bituminous coal. George B. Lessig, Chairman and Manager; J. B. Lessig, Secretary and Treasurer.

Logan Manufacturing Company, Phœnixville, Chester county. Built in 1899–1900 and first blow made January 31, 1900; two 2-gross-ton Tropenas steel converters; product, steel castings; annual capacity, 1,000 tons. Fuel, coke. A gray iron foundry with an annual capacity of 7,500 tons is connected with the works. George F. Huff, President; J. Howard Rhoads, Secretary; John W. Logan, Treasurer and Manager.—*Steel plant idle.*

Longmead Iron Works, Longmead Iron Company, Conshohocken, Montgomery county. Philadelphia office, 434 Drexel Building. Built in 1882 and put in operation in November, 1882; enlarged in 1894; 6 double puddling furnaces, one gas producer, 2 gas heating furnaces, and 3 trains of rolls (one 20-inch muck and one 12 and one 16-inch skelp); product, muck bar and grooved skelp iron; annual capacity, 11,000 tons of muck bar or 20,000 tons of skelp iron. A plant for the manufacture of wrought-iron pipe, with an annual capacity of 20,000 tons, is connected with the works; also a plant for the manufacture of galvanized iron and steel products. Fuel, manufactured gas and bituminous and anthracite coal. Jawood Lukens, President and Treasurer; Lewis N. Lukens, Vice-President; Thomas C. Yocom, Secretary and Superintendent of Rolling Mills; J. H. Atkinson, Superintendent of Tube Mills. Selling agent, Lewis N. Lukens, 434 Drexel Building, Philadelphia.

Ninth Street Mills Department, Reading Iron Company, Reading. —*For description see page 125.*

Oley Street Mills Department, Reading Iron Company, Reading.—*For description see page 125.*

Pencoyd Iron Works, A. and P. Roberts Company, operators, Pennsylvania Building, Philadelphia. Works in Montgomery county, opposite Manayunk. Controlled by the American Bridge Company.—*For description see page 66.*

Phœnix Iron Works, The Phœnix Iron Company, 410 Walnut street, Philadelphia. Works at Phœnixville.—*For description see page 116.*

Pottsgrove Iron Works, Potts Brothers Iron Company, Limited, Pottstown, Montgomery county. Built in 1846; 8 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls; 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. L. Potts, Secretary.

Pottstown Iron Works, Glasgow Iron Company, Pottstown.—*For description see page 127.*

Reading Works, American Iron and Steel Manufacturing Company, Lebanon. Works at Reading.—*For description see page 123.*

Schuylkill Haven Rolling Mill, F. H. Clement & Co., Land Title Building, Philadelphia. Works at Schuylkill Haven, Schuylkill county. Put in operation October 1, 1873; 2 heating furnaces, one busheling furnace, and 2 trains of rolls (one 10-inch and one 16-inch); product, merchant bar iron; annual capacity, 5,500 tons. Fuel, bituminous coal. (Formerly called the Schuylkill Haven Iron Works.)

Schuylkill Iron Works, Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county.—*For description see page 131.*

Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading, Berks county. 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 three 22-inch trains of rolls; product, boiler-tube skelp, pipe skelp, and puddled bar; annual capacity, 15,000 tons of skelp iron and 10,000 tons of puddled bar. Fuel, bituminous coal. Brand, "Seyfert."—*Idle and for sale.*

Sheet Mill Department, Reading Iron Company, Reading.—*For description see page 125.*

Stanford Rolling Mills, E. Stanford, lessee, Conshohocken, Montgomery county. Built in 1881–2 and remodeled in 1901; 6 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 18-inch bar and two 20-inch black plate, hot, and one 20-inch cold); product, muck bar and black plates or sheets for tinning; annual capacity, 8,000 tons of muck bar and 2,000 tons of black plates or sheets. Fuel, bituminous coal. (Owned by R. D. Wood & Co., Philadelphia; formerly called the Plymouth Rolling Mills.)

Number of rolling mills and steel works in the Schuylkill Valley: 31. Of these 2 have idle Bessemer steel plants, one has a Tropenas steel plant, one has a Bookwalter steel plant, 5 make open-hearth steel, and one makes crucible steel.

PIG AND SCRAP IRON BLOOMARIES—2.

Exeter Steam Forge, H. C. Seidel, Lorane, Berks county. 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, Chester county. Built in 1884; 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, "Spring City." E. B. Leaf, President; G. H. Leaf, Secretary and Treasurer. Selling agents, E. B. Leaf & Co., Real Estate Trust Building, Philadelphia.

Number of pig and scrap iron bloomaries in the Schuylkill Valley: 2.

EASTERN PENNSYLVANIA DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works located in Delaware County and in a part of Chester County.

MIXED ANTHRACITE COAL AND COKE FURNACES—1.

Tidewater Furnace, Tidewater Steel Company, Chester, Delaware county. Works at Thurlow Station. One stack, 70 x 17, first blown in in November, 1881; rebuilt in 1892; three Foote stoves; fuel, anthracite coal and coke; ore, foreign; product, basic pig iron; annual capacity, 50,000 tons. Brand, "Tidewater." Connected with the furnace are 40 Semet-Solvay by-product coke ovens with an annual capacity of 75,000 net tons.—*Active in 1903. See Tidewater Steel Company, page 230.*

CHARCOAL FURNACES—1.

Isabella Furnace, William M. Potts, Wyebrooke, Chester county. One stack, 60 x 7¾, 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.*

Number of mixed anthracite coal and coke and charcoal furnaces in the Eastern Pennsylvania District: 2 stacks. Of these one uses anthracite coal and coke mixed and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—14 COMPLETED AND 1 PROJECTED.

Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county.—*For description see pages 129-30.*

Chester Steel Castings Company, 407 Sansom st., Philadelphia. Works at Chester, Delaware county. 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, 15,000 tons. Fuel, coal. E. Waterman Dwight, President and Treasurer; A. G. Lorenz, Secretary; C. R. H. Cunningham, General Manager.

Coatesville Department, Saxton Furnace Company, William H. Staake, Trustee in Bankruptcy, Franklin Building, Philadelphia. Main office of the company, Manhattan Building, Philadelphia. Works at Coatesville, Chester county. 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, iron and steel plates; annual capacity, 18,000 tons. Fuel, bituminous coal. (Formerly called the Valley Iron Works.) —*Idle and for sale on June 1, 1904.* *See Saxton Furnaces, page 241.*

Combination (The) Steel and Iron Company, Chester, Delaware county. Built in 1880; 6 heating furnaces, 4 busheling furnaces, and 3 trains of rolls (12, 18, and 23-inch); product, iron or steel angles, bars, shapes, light rails, splice bars, and skelp; annual capacity, 45,000 tons. Fuel, bituminous coal. W. A. Weed, President, 29 Broadway, New York; T. S. Weed, Secretary and Treasurer, Chester. (Formerly operated by the Chester Iron and Steel Company.)—*Idle and for sale or lease.*

Crum Lynne Iron and Steel Company, John Graham, Receiver, Crum Lynne, Delaware county. 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 double puddling furnaces, 8 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, skelp iron for boiler tubes; annual capacity, 12,000 tons. A forge connected with the works contains 12 charcoal refinery fires and one 1¾-ton steam hammer; annual capacity, 7,500 tons of blooms, all consumed by the company in the manufacture of boiler tube skelp. Fuel, bituminous coal in the rolling mill and charcoal in the forge.

Delaware River Steel Casting Company, Chester, Delaware county. Built in 1903–4; two 35-gross-ton acid open-hearth steel furnaces and 2 annealing furnaces; steel not made down to June 1, 1904; product, steel castings for machinery, engines, electrical work, locomotives, ships, etc.; annual capacity, 18,000

tons. Fuel, coal and producer gas. E. H. Goodman, President; William S. Logan, Vice-President and General Manager; J. W. Booth, Secretary and Treasurer.

Lukens Iron and Steel Works, Lukens Iron and Steel Company, Coatesville.—*For description see pages 132–33.*

Parkesburg Iron Works, The Parkesburg Iron Company, Parkesburg, Chester county. First started in April, 1873; enlarged in 1887 and 1889; 3 double puddling furnaces, 13 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,) and 3 hammers; product, boiler tube skelp iron; annual capacity, 19,000 tons. A forge connected with the works contains 22 charcoal refinery fires and has an annual capacity of 17,000 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. Brand, "P. I. Co." 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, Delaware county. Built in 1892 and first steel made September 25, 1892; three 30-gross-ton acid open-hearth steel furnaces and 2 annealing furnaces; product, steel castings; annual capacity, single turn, 12,000 tons. Also makes cast-steel pipe. Fuel, manufactured gas. M. H. Bickley, President; George M. Booth, Secretary and Treasurer; W. S. Bickley, Manager.

Seaboard Steel Casting Company, foot of Jeffrey st., Delaware river, Chester, Delaware county. 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, gas. Wm. C. Sproul, President; Joseph W. Cochran, Secretary and Treasurer; D. G. Stokes, Comptroller; S. E. Sproul, General Superintendent.

Solid Steel Casting Company, Chester, Delaware county. 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; two 20-gross-ton acid open-hearth furnaces, 3 coal-fired annealing furnaces, and 8 mould drying ovens; annual capacity, 10,000 tons of castings; specialties, all forms of locomotive and machinery castings. Fuel, manufactured gas. Works partly destroyed by fire on August 8, 1893; rebuilt in same year and put in operation December 2, 1893, a machine shop being added. Present company started plant in May, 1899, making extensive alterations and additions. Felton Bent, President; Richard Peters, Jr., Secretary and Treasurer; P. J. McEntee, Superin-

tendent; J. F. Coale, Assistant Superintendent; R. C. Appleby, Sales Agent.

Thurlow Works, American Steel Foundries, New York. Works at Thurlow, Delaware county.—*For description see page 96.*

Tidewater Steel Company, Chester, Delaware county. 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 112 x 31 inches, and one 3-high plate mill with finishing rolls 72 x 25 inches in combination with 72 x 25-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 35 and two 50-gross-ton); annual capacity, 125,000 tons of ingots. Fuel, manufactured gas. Brand, "Tidewater." C. E. Stafford, President; W. B. Johnston, Secretary and Treasurer; C. F. Berkenbush, General Superintendent.—*See Tidewater Furnace, page 227.*

Viaduct Iron Works, Worth Brothers Company, Coatesville. Operated by the Coatesville Rolling Mill Company.—*See page 130.*

PROJECTED STEEL PLANT—1.

Eddystone Engineering Works, Tindel-Morris Company, Eddystone, Delaware county. Built in 1901; product, steel forgings, machinery, engines, etc. May erect an open-hearth steel furnace. Adam Tindel, President and Treasurer; L. I. Morris, Vice-President and Secretary.

Number of rolling mills and steel works in the Eastern Pennsylvania District: 14 completed and one projected. Of these 9 make open-hearth steel and one open-hearth steel plant is projected and one makes steel by the McHaffie process.

UPPER SUSQUEHANNA VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Pig and Scrap Iron Bloomaries in Lackawanna, Montour, Columbia, Northumberland, Union, Luzerne, and Lycoming Counties; also in a part of Perry County

MIXED ANTHRACITE COAL AND COKE FURNACES—1.

Danville Bessemer Furnace, Danville Bessemer Company, 13 South Water st., Philadelphia. Furnace at Danville, Montour county. One stack, 60 x 16, built in 1869 and remodeled in 1884; overhauled in 1899; two nests of Grove iron stoves, each containing six stoves; fuel, anthracite coal and coke; ores, soft fossil from Montour county, Pa., hematite and magnetic from New York, New Jersey, and Lake Superior, and foreign; product,

foundry, Bessemer, and mill pig iron; annual capacity, 27,000 tons. Brand, "Danville."—*Last active in 1900. For sale. See Danville Bessemer Company, this page.*

CHARCOAL FURNACES—1.

Glen Iron Furnace, The Glen Iron Furnace Company, 230 Real Estate Trust Building, Philadelphia. Furnace at Glen Iron, Union county. 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; ore, local fossiliferous; fuel, charcoal; product, cold-blast pig iron; annual capacity, 2,500 tons. Brand, "Glen Iron." Thomas Scattergood, President; James E. Tatnall, Vice-President and General Manager; J. Henry Scattergood, Secretary and Treasurer; John T. Church, Superintendent. Selling agents, J. H. Hillman & Son, Pittsburgh.—*Active in 1903.*

Number of mixed anthracite coal and coke and charcoal furnaces in the Upper Susquehanna Valley: 2 stacks. Of these one uses anthracite coal and coke mixed and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—15 COMPLETED AND 1 BUILDING.

Danville Bessemer Company, 13 South Water st., Philadelphia. Works at Danville, Montour county. Mill formerly known as the Co-operative Iron and Steel Works; also as the North Branch Steel Works. Established in 1871; open-hearth steel plant added in 1882–3 and first steel made February 15, 1883; one 10-gross-ton acid open-hearth steel furnace; annual capacity, 8,000 tons. Rolling mill contains 2 coal and 2 gas heating furnaces and one 28 x 62 and one 28 x 36-inch shovel plate train; product, plates for sale and for the consumption of the company in the manufacture of shovels, scoops, spades, agricultural seats, railroad tie plates, braces, etc.; annual capacity, single turn, 5,000 tons of plates and 90,000 dozen shovels. Fuel, manufactured gas and bituminous coal. John J. MacDonald, President; A. Loudon Snowden, Vice-President; H. Nelson Day, Secretary and Treasurer; J. L. Barber, General Manager.—*Idle and for sale. See Danville Bessemer Furnace, pages 230–31.*

Danville Rolling Mill, James Collins Jones, attorney, 460 Bullitt Building, Philadelphia. Works at Danville, Montour county. Built in 1883; 9 double puddling furnaces, 2 large heating furnaces, and 2 trains of rolls (one 18-inch puddle and one 3-high 20-inch plate); product, muck bar; annual capacity, 13,000 tons. Fuel, coal. Brand, "Danville." Owned by James B. Coryell, Penn Square Building, Philadelphia. (Formerly operated by the Danville Rolling Mill Company.)—*Idle and for sale.*

Danville Structural Tubing Company, (a copartnership,) Danville, Montour county. 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 special 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 structural tubing and other rolled products. Fuel, coal. The structural tubing is covered by patents, and consists of round unwelded tubing from ½ of an inch to 2 inches in diameter. T. J. Price, General Manager, and S. C. Rebman, Sales Agent. (Formerly operated by Howe & Polk; 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, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; partly destroyed by fire in February, 1904; immediately rebuilt; 42 puddling furnaces, 7 heating furnaces, 5 trains of rolls, (two 18-inch puddle and one 8, one 16, and one 20-inch finishing,) and 50 cut-nail machines; product, bar iron and iron and steel cut nails; annual capacity, 13,000 tons of bar iron and 125,000 kegs of nails. Fuel, bituminous coal. Brand, "Duncannon." A foundry and a machine shop are connected with the works. Rodman Wister, President; William L. Coover, Secretary; George Pennell, Treasurer and General Manager.

Green Ridge Iron Works, Susan Spencer, owner, Scranton, Lackawanna county. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; enlarged in 1887; 2 heating furnaces, 4 spike machines, and 2 trains of rolls (10 and 12-inch); product, bar iron, mine-car axles, strap rails, railroad spikes, toe-calk steel, light forgings, and general machine work; annual capacity, single turn, 5,500 tons. Fuel, anthracite coal. Brand, "Green Ridge."—*Idle and for sale or lease.*

Jackson and Woodin Works, American Car and Foundry Company, St. Louis, Mo. Works at Berwick, Pa.—*See page 164.*

Milton (The) Manufacturing Company, Milton, Northumberland county. Built in 1886–7; first put in full operation in February, 1889; 10 double puddling furnaces, 3 heating furnaces, one steam hammer, and 3 trains of rolls (one 3-high 20-inch puddle and one 10 and one 16-inch finishing); product, muck bar and bar iron; annual capacity, about 17,000 tons of muck bar, of which about 8,000 tons are for sale, and 15,000 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; E. S. Shimer, Vice-President and Treasurer; W. A. Heinen, Assistant Treasurer; Thomas M. Miles, Superintendent.

Milton Nail Works, F. A. Godcharles Company, Milton, Northumberland county. 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, one 3-high puddle and one 20-inch finishing train of rolls, and 101 cut-nail machines; product, 3, 4, and 5-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." Selling agents, Fuller Brothers & Co., 139 Greenwich st., New York.

Milton Rolling Mill and Forge, The Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 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, 12,000 tons of bar iron and 3,500 tons of hammered slabs. Fuel, bituminous coal. Brand, "Milton." C. L. Rogers, President; John Jenkins, General Manager.

Montour Rolling Mills Department, Reading Iron Company, Reading. Works at Danville.—*For description see page 125.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. 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 94 cut-nail machines; product, iron and steel cut nails and muck bar; annual capacity, 250,000 kegs of cut nails on single turn and 10,000 tons of muck bar on double turn. Fuel, bituminous and anthracite coal. Brand, "Van Alen & Co." Sales made by the firm and by Oliver Wade, 18 Broadway, N. Y.

Scranton Bolt and Nut Company, Scranton, Lackawanna county. New York office, Broad Exchange, 25 Broad st. Built in 1899 and first put in operation November 22, 1899; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 20-inch muck and one 12-inch finishing); product, merchant bars, bolts, nuts, and other iron products; annual capacity, 18,000 tons. Fuel, anthracite and bituminous coal. Brand, the letter Z inclosed in a diamond. A machine shop is connected with the works. W. D. Zehnder, President; C. H. Zehnder, Vice-Presi-

dent; L. M. Horton, Secretary and Treasurer; E. M. Zehnder, General Superintendent.

Sweet's Steel Company, Williamsport, Lycoming county. Building works at Newberry, near Williamsport, using machinery formerly in the Onondaga Steel Works, at Syracuse, New York; ground broken in August, 1903; will be equipped with three 12-gross-ton Siemens basic open-hearth steel furnaces, 5 gas producers, 5 heating furnaces, (one Siemens and 4 Sweet's,) 2 forge fires, 4 trains of rolls, (two 9 and two 13-inch,) and 3 hammers (one 200, one 1,000, and one 2,000-lb.); product, open-hearth ingots, special qualities of rolled and forged open-hearth steel, special shapes, and special analysis steel; annual capacity, 25,000 tons of ingots and 30,000 tons of rolled and forged products. Fuel, coal and manufactured gas. Edward H. Burdick, President; H. L. Stevens, Vice-President; C. H. Knapp, Secretary and Treasurer; J. W. Maxwell, General Manager.—*See Onondaga Steel Works, pages 202–3.*

Timmes & Hecht, Scranton, Lackawanna county. Branch office and storehouse, 281 North Sixth st., Brooklyn. Built in 1901 and put in operation on December 2, 1901; 3 heating furnaces, 2 trains of rolls, (one 10-inch guide and one 18-inch bar,) and 10 spike machines; product, merchant bar iron; also black and galvanized railroad, mine, dock, and boat spikes; also hand-made nails and rivets; annual capacity, 10,000 tons of bar iron. A galvanizing plant is connected with the works. Fuel, bituminous and anthracite coal. Brand, "T. & H."

Williamsport Iron and Nail Works, Williamsport Iron and Nail Company, Williamsport, Lycoming county. 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 93 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; Charles H. Hand, Secretary; John Jenkins, General Manager. Selling agents, E. L. Hand & Co., 616 Market st., Philadelphia; Dietrich Brothers, 344 North st., Baltimore, Maryland.

Wyoming (The) Shovel Works, Wyoming, Luzerne county. 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 completed and one building. Of these one has an open-hearth steel plant and one open-hearth steel plant is being built.

PIG AND SCRAP IRON BLOOMARIES—1.

Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862, abandoned in 1889, and revived in 1899; 7 forge fires and one hammer; steam power; product, charcoal blooms and slabs for boiler tubes made from iron and steel scrap; annual capacity, single turn, 1,500 tons. Brand, "Perry." Sales made by the firm. Charcoal pits with an annual capacity of about 60,000 bushels are also operated by the firm. All the charcoal made is consumed by the forge.

Number of bloomaries in the Upper Susquehanna Valley: one.

LOWER SUSQUEHANNA VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Bloomaries in York, Lebanon, Dauphin, Cumberland, and Lancaster Counties.

COKE AND MIXED ANTHRACITE AND COKE FURNACES—19.

Aurora Furnace, Susquehanna Iron and Steel Company, Columbia. Furnace at Wrightsville. One stack; fuel, anthracite coal and coke.—*For description see page 128.*

Bird Coleman Furnaces, Lackawanna Iron and Steel Company, Lebanon. Furnaces at Cornwall. Two stacks; fuel, coke.—*For description see page 103.*

Colebrook Furnaces, Lackawanna Iron and Steel Company, Lebanon. Furnaces at Lebanon. Two stacks; fuel, coke.—*For description see page 103.*

Lebanon Furnaces, The Pennsylvania Steel Company, Philadelphia. Furnaces at Lebanon. Two stacks; fuel, anthracite coal and coke. —*For description see page 118.*

Lebanon Valley Furnace, Lebanon Valley Furnace Company, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867, blown in December 23, 1867, and remodeled in 1884; two Whitwell stoves; fuel, $\frac{1}{16}$ anthracite coal and $\frac{15}{16}$ coke; ore, principally Cornwall; product, foundry pig iron; annual capacity, 24,000 tons. Brand, "Logan." E. Burd Grubb, President; Richard Meily, Treasurer; John Meily, Secretary. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia. (Formerly operated by J. & R. Meily.)—*Active in 1903.*

Lochiel Furnace, The Pennsylvania Steel Company, Philadelphia. Furnace at Harrisburg. One stack; fuel, anthracite coal and coke.—*For description see page 118.*

North Cornwall Furnace, Lackawanna Iron and Steel Company,

Lebanon. Furnace at Cornwall. One stack; fuel, coke.—*For description see page 104.*

Paxton Furnaces, Central Iron and Steel Company, Harrisburg. Two stacks; fuel, anthracite coal and coke.—*For description see page 134.*

Standard Furnaces, Standard Iron Mining and Furnace Company, 302–4 Drexel Building, Philadelphia. Furnaces at Chickies, Lancaster county. 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 from Cornwall, Lebanon county; product, low-phosphorus pig iron; total annual capacity, 33,500 tons. Brand, "Chickies." Connected with the furnaces is an ore briquetting plant with a daily capacity of 140 tons. (Formerly called Chickies Furnaces.)—*Active in 1900.*

Steelton Furnaces, The Pennsylvania Steel Company, Philadelphia. Furnaces at Steelton. Four stacks; fuel, anthracite coal and coke.—*For description see pages 118–19.*

Vesta Furnace, Susquehanna Iron and Steel Company, Columbia. Furnace at Vesta. One stack; fuel, anthracite coal and coke.—*For description see page 128.*

Number of furnaces in the Lower Susquehanna Valley: 19. Of these 14 use anthracite coal and coke mixed and 5 use coke alone.

ROLLING MILLS AND STEEL WORKS—21.

Central Iron Works, Central Iron and Steel Company, Harrisburg. —*For description see page 134.*

Central Works, American Iron and Steel Manufacturing Company, Lebanon.—*For description see pages 122–23.*

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) lessees, Harrisburg, Dauphin county. 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." James B. Bailey, President; Edward Bailey, Vice-President; John C. Harvey, Secretary and Treasurer. (Owned by the Central Iron and Steel Company.)—*See page 134.*

Columbia Mill, Susquehanna Iron and Steel Company, Columbia.—*For description see page 128.*

East End Mill, Susquehanna Iron and Steel Company, Columbia.—*For description see page 128.*

East Works, American Iron and Steel Manufacturing Company, Lebanon.—*For description see page 123.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg, Dauphin county. Original plant for the manufacture of wrought iron and steel pipe built in 1890; open-hearth steel plant and rolling mill added in 1902–3; first steel made August 5, 1903; rolling mill put in operation in January, 1904; 2 continuous regenerative billet and slab heating furnaces, 2 trains of rolls, (one 14 and one 20-inch,) one hydraulic billet press with an annual capacity of 60,000 tons, and three 40-gross-ton Siemens basic open-hearth steel furnaces with an annual capacity of 70,000 tons of ingots and castings; product, steel ingots, castings, billets, skelp, flat, square, and round bars, angles up to 6 x 6 inches, tees, light channels, and other special shapes; annual capacity, 60,000 tons of rolled material. Brand, "Harrisburg P. & P. B. Co." Fuel, manufactured gas. 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 a department for the manufacture of iron and brass coils, feed-water heaters, freezing plates, etc. Seamless steel cylinders for high-pressure gases a specialty. J. Hervey Patton, President and General Manager; E. Z. Wallower, Vice-President; W. T. Hildrup, Jr., Secretary and Treasurer; D. E. Tracy, General Superintendent.

Harrisburg Rolling Mill Company, Harrisburg, Dauphin county. Original works built in 1865 to roll rails; 4 single and 15 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 9, one 16, and two 19-inch); product, skelp iron; annual capacity, 30,000 tons. Fuel, coal. R. C. Neal, President and Treasurer; C. E. Covert, Secretary. Selling agents, Charles K. Barns & Co., Real Estate Trust Building, Philadelphia.

Lalance and Grosjean Manufacturing Company, Harrisburg, Dauphin county. Main office, 19 Cliff st., New York; branch offices, Boston and Chicago. Built in 1892–3 and first put in operation February 22, 1893; 9 heating furnaces, one bar, one sheet, and 4 tin mills, and 3 stands of 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, coal. A foundry with an annual capacity of about 1,500 tons of gray iron castings and a machine shop are connected with the works. (A forge for the manufacture of charcoal knobbled blooms has been dismantled.) A. J. Cordier, President, James Cochran, Vice-President, and James D. Fleming, Secretary and Treasurer, New York; J. P. Luce, Manager, Harrisburg.—*See Tinplate and Terne Plate Works.*

Lebanon Iron and Steel Company, Lebanon, Lebanon county. 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 June 1, 1904; 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, President and Manager. (Formerly called the Lebanon Rolling Mills.)

Lebanon Valley Iron Company, Lebanon, Lebanon county. Built in 1902–3, utilizing machinery from the abandoned Norristown Iron Works, at Norristown, Pa.; first put in operation January 12, 1903; 8 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (one 7½-inch guide and one combination with 16-inch roughing and 10-inch finishing rolls); product, muck bar and merchant bar iron; annual capacity, 18,000 tons of bar iron. Fuel, bituminous coal. H. H. Light, President; William S. Davis, Secretary; S. P. Light, Treasurer.

Norway Iron and Steel Company, York, York county. Built in 1900 and first put in operation December 13, 1900; one 10-gross-ton acid open-hearth steel furnace and 4 annealing furnaces; product, small steel castings for gear work, etc.; annual capacity, 6,000 tons of steel castings. Also makes malleable iron castings. Fuel, coal, coke, and producer gas. W. F. Bay Stewart, President; J. W. Steacy, Vice-President; H. H. Weber, Secretary; C. C. Frick, Treasurer.

Open Hearth Steel Works, Central Iron and Steel Company, Harrisburg.—*For description see page 134.*

Paxton Rolling Mills, Central Iron and Steel Company, Harrisburg. —*For description see page 134.*

Penn Iron Works, Penn Iron Company, Limited, Lancaster, Lancaster county. 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, 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.—*For description see pages 119–20.*

Susquehanna Mill, Susquehanna Iron and Steel Company, Columbia.—*For description see page 128.*

Union Street Mill, Susquehanna Iron and Steel Company, Columbia.—*For description see page 128.*

West End Rolling Mill Company, Lebanon, Lebanon county. Built in 1872–4; 4 double puddling furnaces, 2 heating furnaces, 3 trains of rolls, (one 8, one 14, and one 20-inch,) and one hammer; product, bar iron, skelp, socket iron, and chains; annual capacity, 5,000 tons. Fuel, coal. 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; H. M. Capp, Treasurer and General Manager; John R. Evans, Secretary.

West Works, American Iron and Steel Manufacturing Company, Lebanon.—*For description see page 123.*

York Mill, Susquehanna Iron and Steel Company, Columbia. Works at York.—*For description see pages 128–29.*

Number of rolling mills and steel works in the Lower Susquehanna Valley: 21. Of these one makes Bessemer steel and 5 are equipped for the manufacture of open-hearth steel.

PIG AND SCRAP IRON BLOOMARIES—1.

Lucknow Forge, Lucknow Iron and Steel Company, lessee, Harrisburg, Dauphin county. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg. 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 plate, sheet iron, wire, tube, skelp, tinplates, etc., made from pig and scrap iron; annual capacity, 6,500 tons. Fuel, charcoal. John W. Reily, Manager of Forge. (Owned by the Lucknow Forge Company, Limited.)—*See Glendale Mill, page 224.*

Number of bloomaries in the Lower Susquehanna Valley: one.

JUNIATA VALLEY.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Pig and Scrap Iron Bloomaries 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, Centre county. Philadelphia office, 610 Bullitt Building. 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;

ore, native hematite; product, foundry, forge, and malleable pig iron; annual capacity, 50,000 tons. Brand, "Bellefonte." J. W. Gephart, President and General Manager; Charles M. Clement, Vice-President; L. T. Munson, Secretary; William J. McHugh, Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Colonial Furnaces, Colonial Iron Company, Riddlesburg, Bedford county. Two alternate stacks, each 60 x 14, built in 1868 and 1870; the first stack was put in blast July 4, 1869, and the second March 4, 1871; four Player stoves; fuel, Broad Top coke made from coal mined on the furnace property; ores, "Old Sterling" from Jefferson county, New York, and Lake Superior; product, foundry and forge pig iron; specialty, a strong, soft, fluid foundry pig iron; total annual capacity, 36,000 tons. Brands, "Norway," "Keystone," "Kemble," and "Colonial." Henry H. Adams, President and Treasurer, and C. H. Eldridge, Assistant Treasurer, 177 Broadway, New York; John M. Reynolds, Vice-President, Bedford, Pa.; Joseph F. Moore, Secretary, Morristown, N. J.; William Lauder, General Manager, Riddlesburg, Pa. Selling agent, Henry H. Adams, 177 Broadway, New York.—*Active in 1903.*

Everett Furnace, Joseph E. Thropp, Earlston, Bedford county. Telegraph and long distance telephone address, Everett. One stack, 75 x 18½, built in 1883–4 and first blown in December 9, 1884; three Siemens-Cowper-Cochrane stoves, each 75 x 18½, and one Hartman stove, 87 x 16; fuel, West Virginia and Broad Top coke, the latter made from coal mined and coked at Kearney; ores, Lake Superior, Pennsylvania, and West Virginia hematites; fossil and hematite iron-ore mines, coal mines, coke ovens, and limestone quarries are a part of the furnace property; product, standard soft and strong foundry and mill pig iron; annual capacity, 72,000 tons. Brand, "Everett." General sales agents, Pilling & Crane, Girard Building, Philadelphia.—*Active in 1903.*

Marshall Furnace, Juniata Furnace and Foundry Company, Newport, Perry county. Philadelphia office, 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; fuel, anthracite coal and coke; ores, local magnetic, fossil, hematite, and Lake Superior; product, foundry pig iron; annual capacity, 18,000 tons. Brand, "Marshall." Alfred Marshall, President; Edward E. Marshall, Vice-President and General Manager; Edward T. Adams, Secretary; W. W. Marshall, Treasurer. Selling agents, Marshall Brothers & Co., Girard ave. below Front st., Philadelphia.—*Active in 1903.*

Nittany Iron Company, Bellefonte, Centre county. 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 Centre county and Lake Superior; product, foundry and forge pig iron; annual capacity, 36,000 tons. Brand, "Nittany." Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly owned by the Valentine Iron Company; purchased by the Nittany Iron Company in April, 1902, and put in blast by that company June 3, 1902.)—*Active in 1903. See Nittany Iron Company, page 244.*

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; 4 Pollock hot-blast stoves; fuel, Broad Top coke; ores, soft fossil 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; Kenneth Robertson, 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 1903.*

Saxton Furnaces, Saxton Furnace Company, William H. Staake, Trustee in Bankruptcy, Franklin Building, Philadelphia. Main office of the company, Manhattan Building, Philadelphia. Furnaces at Saxton, Bedford county. Two stacks: No. 1, 70 x 18, built in 1880–1 and blown in October 16, 1882; three Whitwell stoves, each 70 x 18; No. 2, 71 x 17, built in 1886–7 and blown in November 30, 1889; three Whitwell stoves, each 60 x 18; fuel, Broad Top coke; ores, hematite from the company's mines in Huntingdon county and from Lake Superior; product, foundry, forge, and basic pig iron; total annual capacity, 90,000 tons. Brand, "Saxton." Connected with the furnaces are 159 coke ovens with an annual capacity of 131,000 tons.—*One furnace active in 1903; both furnaces idle and for sale on June 1, 1904. See Coatesville Department, page 228.*

Number of mineral fuel furnaces in the Juniata Valley: 10 stacks. Of these 9 use coke and one uses anthracite and coke mixed.

CHARCOAL FURNACES—3.

Eagle Furnace, Eagle Iron Company, lessee, Roland, Centre county. Telegraph address, Bellefonte. 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; ores, Nittany Valley and Lake Superior; product, pig iron for car wheels; annual capacity, 2,400 tons. John I. Potter, President; H. R. Curtin, Superintendent. (Owned by several estates.) —*Active in 1903.*

Greenwood Furnace, Logan Iron and Steel Company, Burnham, Mifflin county. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. Furnace at Greenwood Furnace P. O., Huntingdon county. One stack, 50 x 11, built in 1864; remodeled in 1899 and 1902; cold blast; fuel, charcoal; ore, red fossiliferous obtained in the vicinity; product, pig iron for car wheels and chilled rolls; annual capacity, 3,200 tons. Brand, "Greenwood." Charcoal pits are connected with the furnace.—*Active in 1903. See Logan Iron and Steel Works, pages 243-44.*

Hecla Furnace, McCoy-Linn Iron Company, Milesburg, Centre county. 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. (Formerly operated by McCoy & Linn.)—*Last active in 1901. See Milesburg Iron Works, pages 244 and 245.*

Number of charcoal furnaces in the Juniata Valley: 3 stacks.

Total number of furnaces in the Juniata Valley: 13 stacks. Of these 9 use coke, one uses anthracite and coke mixed, and 3 use charcoal.

ROLLING MILLS AND STEEL WORKS—11.

Altoona Foundry and Machine Company, Altoona, Blair county. One 10-gross-ton Swindell acid open-hearth steel furnace built in 1901 and 2 double annealing furnaces; product, malleable iron castings but steel castings could be made; daily capacity, 10 tons of malleable castings. Fuel, manufactured gas. Also makes gray iron castings; daily capacity, 30 tons. Also operates a machine shop. J. P. Levan, President; H. K. McCauley, Secretary and Treasurer.—*Open-hearth furnace idle.*

Altoona Iron Company, Altoona, Blair county. 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.

Duncansville Mill, Carnegie Steel Company, Pittsburgh. Works at Duncansville.—*For description see pages 10-11.*

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. 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 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." J. D. Hemphill, President; O. W. Gardner, Vice-President; J. W. Bracken, Treasurer; Thomas J. Hemphill, Secretary.

Howard Rolling Mills, Jenkins Iron and Tool Company, Howard, Centre county. Built in 1840; 2 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); steam and water power; product, bar iron, consumed by the company in the manufacture of hardware specialties and chains; annual capacity, 5,500 tons. Fuel, bituminous coal. Brand, "Howard." A machine shop is connected with the works.—*The company is to be reorganized and new officers elected.*

Juniata Rolling Mill, The Eleanor Iron Company, Hollidaysburg, Blair county. Main office, Tyrone. Branch office, Harrisburg. Built and put in operation in 1866; 13 single puddling furnaces, 2 heating furnaces, one rotary squeezer, 2 trains of rolls, (one 10 and one 20-inch,) 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, Mifflin county, 4 miles from Lewistown, on the M. & C. C. R. R. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. 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, 2 hammers, (one a heavy blooming hammer for Norway and horseshoe iron and hammered charcoal bars,) and 4 trains of rolls (one 8, one 12, and two 18-inch); one 300,000-lb. machine 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." A machine shop is connected with the works. Frank G. Kennedy, President, and Frank G. Kennedy, Jr., Secretary and Treasurer, Harrison Building, Philadelphia.—*See Greenwood Furnace, page 242.*

Milesburg Iron Works, McCoy-Linn Iron Company, Milesburg, Centre county. 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. (Formerly operated by McCoy & Linn.)—*See Hecla Furnace, page 242, and Milesburg Iron Works, page 245.*

Nittany Iron Company, Bellefonte, Centre county. Built in 1798; 4 double puddling furnaces and one train of 18-inch rolls; water power; product, muck bar; annual capacity, 4,000 tons. Fuel, bituminous coal. Brand, "Nittany." J. W. Gephart, President; Frank H. Clemson, Vice-President; William Sampson, Treasurer; L. T. Munson, Secretary. Selling agents, Rogers, Brown & Co., New York and branch offices. (Formerly owned by the Valentine Iron Company; purchased by the Nittany Iron Company in April, 1902.)—*Not in operation in 1903. See Nittany Iron Company, pages 240-41.*

Standard (The) Steel Works, Harrison Building, Philadelphia. Branch offices, 623 Railway Exchange Building, Chicago; 29 Chamber of Commerce, Richmond, Va.; 1511 Empire Building, New York; Security Building, St. Louis; 124 Sansome st., San Francisco, Cal.; and 516 Pioneer Press Building, St. Paul, Minn. Works at Burnham, Mifflin county. Built in 1869 and subsequently altered and improved, especially in 1901, 1902, and 1903; 35 heating furnaces, 31 hammers, (from 1,500 pounds to 20 tons,) and 3 tire mills. Steel department added in 1895; now contains 4 Wellman revolving acid open-hearth furnaces (two 15, one 20, and one 50-gross-ton); first steel made March 18, 1895; product, steel ingots and castings; annual capacity, 40,000 tons. The finished products and specialties of the works are steel locomotive and car-wheel tires, steel-tired car wheels with centres of wrought iron, cast iron, or steel, and steel forgings and castings; annual capacity, 18,000 tons of tires, 8,000 tons of car-wheel centres, and 18,000 tons of steel forgings. In 1903 the manufacture of iron forgings, iron castings, and steel springs was commenced; annual

capacity, 6,000 tons of iron forgings, 20,000 tons of iron castings, (principally locomotive,) and 4,000 tons of steel springs. In 1904 a plant for rolling solid steel wheels was put in operation; this plant is equipped with one wheel rolling mill and two hydraulic presses, (one 500 and one 5,000-ton.) Fuel, coal. Brand, the word "Standard" between two anchors. A machine shop is connected with the works. William Burnham, President and Treasurer, M. Middleton, Vice-President, and N. W. Stevenson, Acting Secretary and Assistant Treasurer, Philadelphia; A. A. Stevenson, Superintendent, Burnham.

Tyrone Forges, The Tyrone Iron Company, Tyrone, Blair county. Office, Harrisburg. Forges established in 1809 and rebuilt in 1870; 10 refinery fires, one double run-out, and one large steam hammer; product, charcoal blooms, all consumed in the rolling mill; annual capacity, 7,500 tons of blooms. Rolling mill added in 1883 and enlarged in 1898; 2 regenerative gas heating furnaces, 2 direct Lauth coal-fired heating furnaces, and 2 trains of rolls (one 16-inch grooved skelp and one 23 x 54-inch two-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, and A. D. Sexton, Secretary, Harrisburg. Sales made by the company.

Number of rolling mills and steel works in the Juniata Valley: 11. Of these one makes open-hearth steel and one has an open-hearth steel furnace for melting iron for malleable castings.

PIG AND SCRAP IRON BLOOMARIES—2.

Curtin Forge Company, Roland, Centre county. Telegraph address, Bellefonte. Built in 1809; remodeled in 1901; 10 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, 2,500 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. (Formerly called Eagle Forge and operated by Curtins & Co.)

Milesburg Iron Works, McCoy-Linn Iron Company, Milesburg, Centre county. Built in 1830; 6 fires and one hammer; water power; product, charcoal blooms; annual capacity, 2,500 tons. Fuel, charcoal. (Formerly operated by McCoy & Linn.)—*See Hecla Furnace, page 242, and Milesburg Iron Works, page 244.*

Number of pig and scrap iron bloomaries in the Juniata Valley: 2.

PITTSBURGH AND ALLEGHENY COUNTY.

COKE FURNACES—41 COMPLETED AND 1 BUILDING.

Carrie Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Rankin. Five stacks; fuel, coke.—*For description see pages 5–6.*

Clairton Furnaces, Clairton Steel Company, Pittsburgh. Furnaces at Clairton. Three stacks; fuel, coke.—*For description see page 71.*

Clinton Furnace, Clinton Iron and Steel Company, West Carson street, Pittsburgh. New York office, 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; F. N. Hoffstot, Treasurer; T. W. Friend, Assistant Treasurer and General Sales Agent.—*Active in 1903.*

Duquesne Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Cochran. Four stacks; fuel, coke.—*For description see page 6.*

Edgar Thomson Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Bessemer. Eleven stacks; fuel, coke.—*See pages 6–7.*

Edith Furnace, American Steel and Wire Company of New Jersey, Chicago. Furnace at Allegheny. One stack; fuel, coke.—*For description see page 41.*

Eliza Furnaces, Jones and Laughlin Steel Company, Pittsburgh. Five stacks; fuel, coke.—*For description see page 138.*

Isabella Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Etna. Three stacks; fuel, coke.—*For description see page 7.*

Lucy Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces on Fifty-first st. Two stacks; fuel, coke.—*For description see page 7.*

Monongahela Furnaces, (National Department,) National Tube Company, Pittsburgh. Furnaces at McKeesport. Two completed stacks and one stack building; fuel, coke.—*For description see page 34.*

Neville Island Furnace, American Steel and Wire Company of New Jersey, Chicago. Furnace on Neville Island, Neville township, below Pittsburgh. One stack; fuel, coke.—*For description see page 42.*

Shoenberger Furnaces, American Steel and Wire Company of New Jersey, Chicago. Furnaces at Pittsburgh. Two stacks; fuel, coke. —*For description see page 42.*

Soho Furnace, Jones and Laughlin Steel Company, Pittsburgh. One stack; fuel, coke.—*For description see page 138.*

Number of coke furnaces in Pittsburgh and Allegheny county: 41 completed stacks and one stack building. No charcoal furnaces.

ROLLING MILLS AND STEEL WORKS—65 COMPLETED AND 1 BUILDING.

Allegheny Steel and Iron Company, Farmers Bank Building, Pittsburgh. Works at Avenue, Allegheny county. Telegraph address, Tarentum. Built in 1900–1 and first put in operation in July, 1901; 6 sheet furnaces, 6 pair furnaces, 10 annealing furnaces, one 28-inch bar mill, one train of hot rolls with 6 finishing mills, (one 26 x 50, three 26 x 40, one 26 x 36, and one 26 x 46-inch,) one train of cold rolls with 5 pairs of 22 x 50-inch mills, and two 45-gross-ton basic open-hearth steel furnaces with an annual capacity of 50,000 tons of ingots; first steel made September 19, 1901; product, billets, sheet bars, and sheet steel; annual capacity, 20,000 tons of billets and sheet bars and 18,000 tons of sheet steel. Fuel, coal and natural gas. Alfred Hicks, President; George A. McLean, Vice-President; R. D. Campbell, Secretary; H. M. Brackenridge, Treasurer; H. E. Sheldon, General Manager.

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Works in the Twenty-fourth and Twenty-fifth wards, South Side.—*For description see pages 138–39.*

Anchor Mills, Neal Brothers, lessees, 421 Wood st., Pittsburgh. Works on Nineteenth st., South Side. Built in 1842; 24 single puddling furnaces, 4 heating and 2 annealing furnaces, and 5 trains of rolls (4 hot and one cold); product, muck bar, skelp, special electric steel sheets, sheet iron, and black plates; also produce terne or lead-coated sheets; annual capacity, 12,000 tons. Fuel, coal and natural gas. Brand, "Anchor." A. H. Neal, Superintendent. All sales made by the firm. (Works owned by Chess Brothers.)—*See Tinplate and Terne Plate Works.*

Anchor Nail and Tack Works and Central Expanded Metal Company, Chess Brothers, 531 Wood st., Pittsburgh. Two mills: Works on Nineteenth st., South Side, built in 1842; equipped with puddling furnaces, heating furnaces, and trains of rolls, which are leased to Neal Brothers and operated under the name of the Anchor Mills; part of plant not leased to Neal Brothers contains 76 tack machines; product, tacks, shoe nails, etc.; annual capacity, 12,000 boxes of tacks; fuel, coal; (90 cut-nail machines, formerly in these works, dismantled.) 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; 8 expanded metal machines for making steel fire-proof lathing, concrete armor, fencing, screens, etc.; fuel, coal for steam and natural gas for heating and annealing.

Black Diamond Steel Works, operated by the Park Steel Company, Pittsburgh. Controlled by the Crucible Steel Company of America, Pittsburgh.—*For description see page 145.*

Boston Iron and Steel Works, (National Department,) National Tube Company, Pittsburgh. Works at McKeesport.—*For description see page 35.*

Braddock Works, American Steel and Wire Company of New Jersey, Chicago. Works at Braddock.—*For description see page 43.*

Byers (A. M.) Company, Pittsburgh. Works on Sixth st., South Side. 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, skelp iron, all consumed in the manufacture of pipe; annual capacity, 16,000 tons. Also operates a galvanizing department; also two pipe mills for the manufacture of lap and butt-welded wrought-iron gas, steam, and water pipe, oil-well tubing, casing, etc.; sizes: butt weld, from ⅛ of an inch to 1¼ inches inclusive, and lap weld, from 1½ to 8 inches; annual capacity, 55,000 tons. Fuel, natural gas in finishing mills and coal in puddling furnaces. Dallas C. Byers, President; Eben M. Byers, Vice-President; H. M. Richardson, Secretary and Treasurer. (Formerly operated by A. M. Byers & Co., incorporated.)—*The A. M. Byers Company owns Mattie Furnace, at Girard, Ohio, which is operated under the name of the Girard Iron Company. See page 309.*

Carbon Steel Works, Carbon Steel Company, Thirty-second st., Pittsburgh. Built in 1862 and rebuilt in 1888; 2 direct air heating furnaces, 6 soaking pits, eight 50-gross-ton open-hearth steel furnaces (five acid and three basic) built in 1888 and subsequent years, and 2 trains of rolls (36-inch universal and 128-inch plate); product, acid and basic open-hearth steel ingots, universal rolled plates, sheared 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." C. M. Raymond, President; A. H. Keith, General Agent. 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, Allegheny county. Built in 1901–2; first tubes made January 9, 1902, and first rolled products made 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 ¼ 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.—*For sale. Address O. F. Grant, 5130 Westminister st., Pittsburgh.*

Clairton Steel Works, Clairton Steel Company, Pittsburgh. Works at Clairton.—*For description see page 71.*

Clark Mill, Carnegie Steel Company, Pittsburgh. Works at Thirty-fifth st., A. V. Railway, and Allegheny river, Pittsburgh.—*For description see page 10.*

Columbia Iron and Steel Foundry, W. J. Carlin Company, Thirty-fourth st. and Railroad ave., Pittsburgh. Built in 1900–1 and first steel made January 25, 1901; one 9-gross-ton acid open-hearth steel furnace; product, steel castings; annual capacity, 2,000 tons. Fuel, natural gas. W. J. Carlin, President; W. G. Carlin, Secretary and Treasurer. (Formerly operated by the Columbia Iron and Steel Foundry Company.)—*Idle and for sale or lease. May be dismantled.*

Crescent Steel Works, Crucible Steel Company of America, Pittsburgh. Works, Forty-ninth to Fifty-first sts.—*See page 145.*

Damascus Nickel Steel Company, Bullitt Building, Philadelphia. Works at Carnegie, Allegheny county. 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, 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.; annual capacity of rolled and forged products, 10,000 tons. Fuel, coal and natural gas. Brands, "Damascus" and "Nickel." A department for drawing wire and drill rods is connected with the works. John W. Woodside, President, B. K. Jamison, Vice-President, George D. Woodside, Treasurer, and Frank Wirgman, Secretary, Philadelphia; J. C. Jamison, Manager and General Sales Agent, Carnegie. (Formerly operated by the Nickel Steel and Forge Company.)

Duquesne Steel Foundry Company, Arrott Building, Pittsburgh. Works at Kendall Station, P. & L. E. R. R., (post-office address of works, Coraopolis,) Allegheny county. Built in 1900 and first steel made August 24, 1900; two 25-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 10,000 tons. Fuel, natural gas. W. A. Herron, President; T. H. Bakewell, Vice-President and Treasurer; L. W. Frank, Secretary; J. H. Murray, Superintendent.

Duquesne Steel Works, Carnegie Steel Company, Pittsburgh. Works at Cochran.—*For description see page 11.*

Edgar Thomson Steel Works, Carnegie Steel Company, Pittsburgh. Works at Bessemer.—*For description see page 11.*

Elba Rolling Mills, (Continental Department,) National Tube Company, Pittsburgh. Works on Second ave.—*See page 35.*

Etna Iron and Tube Works, Spang, Chalfant & Co., Incorporated, Peoples Savings Bank Building, Pittsburgh. Works at Etna, Allegheny county. Manufacturers of bar and skelp iron and wrought-iron welded tubes for gas, water, steam, and oil; also boiler tubes. Built in 1828; rolling mill department contains one double and 25 single puddling furnaces, 3 scrap furnaces, 11 heating furnaces, 6 trains of rolls, (one muck, one plate, and one 8, one 10, one 12, and one 16-inch,) and 3 hammers; product, pipe iron; annual capacity, 90,000 tons. Tube department contains 2 butt-weld and 5 lap-weld furnaces; sizes of pipe, from ⅛ of an inch to 24 inches; of tubes, from 1½ inches to 13 inches; annual capacity, 100,000 tons. Fuel, natural and manufactured gas. This was the first mill to use natural gas exclusively; it still uses it in all departments. Henry Chalfant, President; C. W. Hanford, Vice-President and Treasurer; E. W. Wright, Secretary and Assistant Treasurer.

Firth-Sterling Steel Company, Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; one 36-pot and two 30-pot crucible steel-melting furnaces, 16 heating furnaces, 11 hammers, (from 400 lbs. to 5 tons,) and 3 trains of rolls (one 8, one 10, and one 12-inch); product, fine crucible tool steel and Wheeler-Sterling armor-piercing projectiles; sizes of projectiles made, 4-inch, 5-inch, 6-inch, 8-inch, 10-inch, 12-inch, and 13-inch; annual capacity of tool steel, 10,000 tons; of projectiles, twenty 10-inch per day or their equivalent in other sizes. Fuel, bituminous coal and natural gas. Brand, "Firth-Sterling." A machine shop is connected with the projectile department. Lewis J. Firth, President; Austin A. Wheelock, Vice-President; Eben B. Clarke, Treasurer and General Manager; James E. Porter, Secretary. Selling agents, Wheelock, Lovejoy & Co., New York and Boston; MacFarland & Little, Philadelphia; E. S. Jackman, Chicago; Abner Doble Company, San Francisco.

Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Works, foot of Twelfth st. Open-hearth steel works built in 1882 and first steel made in August of that year; two 10-gross-ton acid furnaces; product, steel castings; annual capacity, 6,000 tons. Fuel, natural gas. Joseph Fawell, President; William M. Westerman, Secretary; Pennock Hart, Treasurer.

Glassport Works, Pittsburgh Steel Company, Pittsburgh. Works at Glassport.—*For description see page 142.*

Glendon Rolling Mill, Dilworth, Porter & Co., Limited, Pittsburgh. Works on the South Side. Built in 1857, partly destroyed by fire in November, 1901, and rebuilt in 1902; 35 heating furnaces, 13 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, tie plates, and merchant bars; annual capacity, 54,000 tons of spikes and 50,000 tons of bar steel and tie plates. Fuel, natural gas and coal. Brands: for spikes, "Dilworth, Porter & Co.;" for tie plates, "Glendon Flange" and "Goldie Claw;" for merchant steel, "Glendon." Lawrence Dilworth, Chairman; F. C. Stoeltzing, Treasurer; W. F. Schleiter, Secretary.

Homestead Steel Works, Carnegie Steel Company, Pittsburgh. Works at Munhall.—*For description see pages 12–3.*

Howard Axle Works, Carnegie Steel Company, Pittsburgh. Works at Homestead.—*For description see page 13.*

Howe, Brown & Co. Works, Crucible Steel Company of America, Pittsburgh. Works at Penn ave. and Seventeenth st.—*For description see pages 145–46.*

Inter-State Steel Company, Brackenridge, Allegheny county, (railroad station, Avenue.) Works for the manufacture of cold-rolled sheets built in 1903–4; equipped with 3 annealing furnaces and one 22-inch train of cold rolls; product, uniform colored, blue, polished cold-rolled sheets; annual capacity, 2,700 tons. Fuel, coal and natural gas. Adding one 26 x 36-inch hot mill. Alfred Hicks, President; L. W. Hicks, Secretary and Treasurer.

Keystone Rolling Mill, John L. McCutcheon and Thomas G. McCutcheon, owners, Pittsburgh. Works, Second ave. near Morris st., Soho. Built in 1865; 36 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls (two muck and one 9, one 18, and one 23-inch plate); product, iron and steel skelp, bar iron, and cotton-ties; annual capacity, 36,000 tons. Fuel, coal. (Formerly operated by the Fort Pitt Iron and Steel Company.)—*Idle and for sale or lease. Address John L. McCutcheon, St. Nicholas Building, Pittsburgh.*

La Belle Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Ridge ave. and Rebecca st., Allegheny.—*For description see page 146.*

Liggett Spring and Axle Company, Pittsburgh. Works at Axleton, Allegheny county, 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 May 25, 1904; 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 rolls used

to reroll iron and steel into shapes for the manufacture of axles; product, buggy and wagon axles and springs; annual capacity, 7,500 tons. Fuel, coal. O. C. Hall, Vice-President and Manager; George W. Wright, Jr., Treasurer.

Lower Union Mills, Carnegie Steel Company, Pittsburgh. Works at Twenty-ninth st., on the Allegheny Valley Railway.—*For description see page 13.*

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 25-gross-ton); product, steel car couplers; annual capacity, 20,000 tons. Fuel, natural and producer gas. An additional 15-gross-ton acid open-hearth furnace is being erected. 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.

McCutcheon Mill, Carnegie Steel Company, Pittsburgh. Works at 88 Rebecca st., Allegheny.—*For description see page 13.*

Mesta Machine Company, Lewis Block, Pittsburgh. Works at Homestead, Allegheny county. Built in 1899 and first steel made November 21, 1899; one 25-gross-ton acid open-hearth steel furnace; product, steel rolls and general castings; also machine-moulded gears; annual capacity, 10,000 tons. May add one 30-gross-ton basic open-hearth steel furnace. Fuel, natural gas. 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; W. L. Slack, Secretary; J. O. Horning, Treasurer; W. D. Rowan, Auditor.

Monongahela Iron and Steel Company, Pittsburgh. Post-office address, box 215. Works at Hays Station, Pittsburgh and Lake Erie Railroad and Pennsylvania Railroad, in Allegheny county. 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 and merchant sizes of bar iron; annual capacity, 15,000 tons. Fuel, natural gas. A plant for the manufacture of chains is connected with the works. Robert A. Carter, President and Manager; W. H. Brunt, Secretary and Treasurer.

Monongahela Steel Works, (National Department,) National Tube Company, Pittsburgh. Works at McKeesport.—*See page 35.*

Monongahela Works, American Sheet and Tin Plate Company,

Pittsburgh. Works on South Fifteenth st.—*For description see page 57.*

National Rolling Mills, (National Department,) National Tube Company, Pittsburgh. Works at McKeesport.—*See page 35.*

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 crow bars and wedges; annual capacity, 120,000 tons. Fuel, coal for steam purposes and natural gas for heating, the latter obtained from the company's properties in Washington and Greene counties, Pennsylvania. James B. Oliver, President; John C. Oliver and Henry B. Lupton, Vice-Presidents; Ralph Theophilus, Treasurer; Charles E. Black, Secretary and Purchasing Agent.

Painter Mill, Carnegie Steel Company, Pittsburgh. Works on South Side.—*For description see pages 14–5.*

Pennsylvania Malleable Company, Frick Building, Pittsburgh. Works at McKees Rocks, Allegheny county. Malleable iron foundry built in 1898 and first put in operation in 1899; four 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. W. H. Schoen, President; David O. Holbrook, Vice-President; A. R. Bassett, Secretary and Treasurer.

Pittsburgh Forge and Iron Company, corner Tenth st. and Penn ave., Pittsburgh. Works in the ninth ward, Allegheny. Built in 1864; 38 single puddling furnaces, 14 heating furnaces, 4 trains of rolls, (one 9, one 16, and two 20-inch,) and 11 hammers (three 800-lb., four 1-ton, two 3-ton, and two 4-ton); product, bolts, nuts, bar iron, splice bars, stay-bolt iron, draw bars, links and pins, arch bars, hammered car and locomotive axles, and general railroad and heavy forgings; annual capacity, 24,000 tons of rolled and 20,000 tons of forged products. Fuel, manufac-

tured gas and natural gas. Brands, "P. F. & I." and "Special." Calvin Wells, President and Treasurer; F. E. Richardson, Secretary; John H. Barr, Manager. Selling agent, F. B. Buss, Chicago.

Pittsburgh Steel Foundry, National Bank of Commerce Building, Pittsburgh. Works at Glassport, Allegheny county. 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, couplers, knuckles, forging ingots, etc.; annual capacity, 60,000 tons. Fuel, natural gas. Stewart Johnston, President; J. M. Lockhart, Vice-President; Augustus Trump, Secretary and Treasurer; D. MacDougall, Superintendent. Selling agents, H. V. Seth, Philadelphia; B. M. Gardner, Chicago.

Pittsburgh Steel Works, Crucible Steel Company of America, Pittsburgh. Works at McKees Rocks.—*For description see pages 146–47.*

Pittsburgh Works, American Steel Foundries, New York. Works, corner Thirty-sixth st. and A. V. Ry., Pittsburgh.—*For description see page 96.*

Port Vue Mills, McKeesport Tin Plate Company, McKeesport. Works at Port Vue, Allegheny county. 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, 25,000 tons of black plates and 400,000 boxes of tinplates. Fuel, coal in the rolling mill and natural gas in the tinplate works. E. R. Crawford, President; E. P. Douglass, Vice-President; E. W. Pitts, Secretary and Treasurer; J. E. Lauck, Manager. Selling agents, Ely and Williams Company, New York.—*See Tinplate and Terne Plate Works.*

Rankin Works, American Steel and Wire Company of New Jersey, Chicago. Works at Rankin Station.—*For description see page 44.*

Republic Iron Works, (National Department,) National Tube Company, Pittsburgh. Works on Twenty-fifth st., South Side.—*For description see pages 35–6.*

Sable Iron Works, Zug & Co., Limited, Pittsburgh. Works, 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 connected with the works has an annual capacity of 6,000 tons. Corrugated sheets are also produced. Fuel, coal, natural gas, and manufactured gas. Brand, "Sable." Charles H. Zug, Chairman; Charles H. Reid, Secretary and Treasurer. Eastern selling agents, Horne Brothers, Boston.

Schoen Steel Wheel Company, Pittsburgh. New York office, 170 Broadway. Works at McKees Rocks, Allegheny county. Built in 1903 and first put in operation in November, 1903; 2 heating furnaces, one special mill for rolling car wheels from steel ingots, and 2 large hydraulic forging presses; product, solid forged and rolled steel wheels for engine tenders and passenger, freight, steam, and electric cars; annual capacity, 25,000 tons. Fuel, natural gas and bituminous coal. Brand, "Solid Forged and Rolled Steel" wheels. Several acid open-hearth steel furnaces may be added in 1904. E. A. Schoen, President; W. Martin Johnson, Vice-President; Frank B. Foster, Secretary; Thomas G. D. Bell, Treasurer; M. R. Jackson, General Manager.

Shoenberger Works, American Steel and Wire Company of New Jersey, Chicago. Works at Fifteenth st. and Penn ave., Pittsburgh. —*For description see page 45.*

Singer, Nimick & Co. Works, Crucible Steel Company of America, Pittsburgh. Works in the thirty-fourth ward.—*For description see page 147.*

Soho Department, Jones and Laughlin Steel Company, Pittsburgh. Works, Second ave., near Brady st.—*For description see page 139.*

Star Works, American Sheet and Tin Plate Company, Pittsburgh. Works at foot of Twelfth st.—*For description see page 60.*

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, Allegheny county. Built in 1892 and first put in operation January 3, 1893; 5 heating furnaces, 2 trains of hot rolls, (one 10 and one 14-inch,) and 15 pair of 10 and 4 pair of 14-inch cold rolls; prod-

uct, hot and cold rolled strip steel; annual capacity, 18,000 tons. Fuel, natural gas and coal. Brand, "Superior." James H. Hammond, President; E. M. S. Young, Secretary and Treasurer; F. R. Schneider, Superintendent.

Twenty-sixth Street Works, American Steel and Wire Company of New Jersey, Chicago. Works at Twenty-seventh and Smallman sts., Pittsburgh.—*For description see pages 45–6.*

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 and 3 forge fires for smith work; product, steel castings; annual capacity, single turn, 12,000 tons. Fuel, natural gas. C. C. Smith, President and General Manager; S. H. Church, Vice-President; G. W. Smith, Secretary; G. W. Eisenbeis, Treasurer.

United States (The) Wire and Nail Company, Lewis Block, Pittsburgh. Works at Shousetown, Allegheny county. Built in 1899–1900 and first put in operation July 1, 1900; 3 reverberatory heating furnaces, 3 trains of rolls, (one 9, one 12, and one 16-inch,) and 42 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 30,000 tons of wire rods, 18,000 tons of wire, and 240,000 kegs of wire nails. Fuel, bituminous coal. I. N. DeNoon, President; E. W. Palmer, Vice-President; J. C. DeNoon, Secretary and Treasurer; M. E. Johnson, General Manager.—*Idle and for sale.*

United States Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Demmler, (eighth ward, McKeesport.)—*For description see page 60.*

Upper Union Mills, Carnegie Steel Company, Pittsburgh. Works on Thirty-third st., Pittsburgh, on the Allegheny Valley Railway.—*For description see page 15.*

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg, Allegheny county. 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." A machine shop is connected with the works. John Moorhead, Jr., President; John P. Carmack, Secretary and Treasurer.

Vulcan Forge and Iron Works, Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks, Allegheny county. Forge built in 1877; rolling mill built in 1882; 31 single puddling furnaces, 5 forge fires, 2 upsetting machines, 7 heating furnaces, 3 trains of rolls, (9, 16, and 23-inch,) and 4 hammers; product, rolled bar iron, bridge iron, soft steel in bars, and hexagon,

grooved, and angle iron and steel; annual capacity, 25,000 tons of finished rolled iron and steel; also hammered iron and steel and all kinds of heavy forgings; annual capacity, 2,500 tons of forgings. Fuel, natural gas and coal. Brands, "Vulcan" and "Lockhart." Charles Lockhart, President; T. J. Gillespie, Secretary and Treasurer.

Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Works, cor. Tenth st. and Duquesne Way. Built in 1829. Decline to give a detailed description of their works.

Wood's Works, American Sheet and Tin Plate Company, Pittsburgh. Works at McKeesport.—*For description see page 61.*

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 65 completed and one building. Of these 7 make Bessemer steel, 26 can make open-hearth steel and one open-hearth plant is projected, 10 make crucible steel, and 4 make blister steel.

SHENANGO VALLEY AND BEAVER COUNTY.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Beaver, Lawrence, and Mercer Counties.

COKE FURNACES—18 COMPLETED, 2 BUILDING, AND 1 REBUILDING.

Alice Furnace, The Youngstown Iron Sheet and Tube Company, Youngstown, Ohio. Furnace at Sharpsville, Mercer county, Pa. One stack, 75 x 14½, 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." E. H. Williams, Superintendent. Sales made by the company. (Formerly operated by Pickands, Mather & Co.)—*Active in 1903. See Youngstown Works, page 311.*

Atlantic Furnace, operated by the Atlantic Iron and Steel Company, New Castle. One stack; fuel, coke. Controlled by the Republic Iron and Steel Company, Chicago.—*For description see page 83.*

Claire Furnace, Claire Furnace Company, Sharpsville, Mercer county. Branch office with M. A. Hanna & Co., Cleveland, Ohio. One stack, 75 x 16, built in 1869 and rebuilt in 1886, 1893, 1897, and 1902; 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 E. R. Bolton, Secretary, Cleveland; Leon J. Robbins, Treasurer, and J. W. Robbins, General Manager, Sharpsville. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1903.*

Ella Furnace, Pickands, Mather & Co., Cleveland, Ohio. Furnace at West Middlesex, Mercer county, Pa. One stack, 70 x 14½, built and blown in in 1882; remodeled in 1892 and 1899; four Wheeler pipe hot-blast stoves; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and malleable pig iron; annual capacity, 80,000 tons. Brands, "Ella Foundry," "Ella Strong Foundry," and "Ella Malleable." E. H. Williams, Manager. Selling agents, Pickands, Mather & Co., Cleveland.—*Active in 1903.*

Fannie Furnace, The Cherry Valley Iron Company, Peoples Saving Bank Building, Pittsburgh. Furnace at West Middlesex, Mercer county. 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; four iron stoves; fuel, coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 80,000 tons. Brand, "Fannie." Joshua W. Rhodes, President; Edwin N. Ohl, Vice-President; Robert W. Flenniken, Secretary and Treasurer; E. M. Peters, Superintendent. Sole selling agents, Joshua W. Rhodes & Co., Pittsburgh.—*Active in 1903. See Cherry Valley Furnace, page 307.*

Hall Furnace, Republic Iron and Steel Company, Chicago. Furnace at Sharon. One stack; fuel, coke.—*For description see page 83.*

Mabel Furnace, Perkins & Co., Limited, Sharpsville, Mercer county. One stack, No. 1, 75 x 15½, built in 1872 and rebuilt in 1883 and 1899; four Pollock iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, foundry, malleable, and standard Bessemer pig iron; annual capacity, 75,000 tons. Brand, "Mabel." S. Perkins, Jr., Chairman; L. C. Hanna, Secretary and Treasurer; J. W. Robbins, Manager. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1903.*

New Castle Furnaces, Carnegie Steel Company, Carnegie Building, Pittsburgh. Furnaces at New Castle. Four stacks, two completed, one rebuilding, and one building; fuel, coke.—*For description see page 8.*

Northside Iron Company, Incorporated, Sharpsville, Mercer county. One stack, 35 x 7, built in 1902 and blown in August 1, 1902; one cast-iron pipe stove; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 18,000 tons. S. A. Robinson, President; Andrew Nickle, Vice-President and Manager; C. B. Kantner, Secretary and Treasurer. Sales made by the company.—*Idle.*

Sharon Furnace, Carnegie Steel Company, Carnegie Building, Pittsburgh. Furnace at Sharon. One stack; fuel, coke.—*For description see page 9.*

Sharpsville Furnace, Sharpsville Furnace Company, (not incorpo-

rated,) Sharpsville, Mercer county. 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; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 72,000 tons. Brand, "Sharpsville." Frank Pierce, Secretary and Treasurer; James B. Pierce, General Manager.—*Active in 1903.*

Shenango Furnaces, Shenango Furnace Company; general offices, Frick Building, Pittsburgh. Furnaces at Sharpsville, Mercer county. Three 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 17, built in 1895 and blown in September 1, 1895. Nos. 1 and 2 have two Pierce and three Pollock iron pipe stoves and No. 3 has four Whitwell stoves. Fuel, Connellsville coke; ore, Lake Superior; product, foundry, standard Bessemer, basic, and malleable pig iron; total annual capacity, 200,000 tons. Brand, "Shenango." Equipped with one Aultman pig-iron casting machine. The No. 3 furnace will shortly be equipped with four new fire-brick stoves; this furnace was formerly operated by the Spearman Iron Company. W. P. Snyder, President, Henry Irwin, Jr., Treasurer, and George L. Brown, Secretary, Pittsburgh; W. A. Barrows, Jr., General Manager, and G. D. Devitt, General Superintendent, Sharpsville. Selling agents, W. P. Snyder & Co., Pittsburgh.—*Active in 1903.*

South Sharon Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Sharon. Three stacks, two completed and one building; fuel, coke.—*For description see page 9.*

Stewart Furnace, Stewart Iron Company, Limited, Sharon, Mercer county. One stack, 75 x 17, built in 1872, enlarged in 1883, and rebuilt in 1892; four Kennedy-Cowper 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, 82,000 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, Fayette county, Pa., with an annual capacity of 90,000 net tons. S. McClure, Agent and General Manager. Sales made by H. H. Brown, Treasurer, Cleveland, Ohio.—*Active in 1903.* *See Stewart Iron Works, page 263.*

Number of coke furnaces in the Shenango Valley: 18 completed stacks, 2 stacks building, and one stack rebuilding.

ROLLING MILLS AND STEEL WORKS—30 COMPLETED AND 1 PROJECTED.

Aliquippa Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Aliquippa.—*For description see page 144.*

Atlantic Works, operated by the Atlantic Iron and Steel Company, New Castle. Controlled by the Republic Iron and Steel Company, Chicago.—*For description see page 84.*

Beaver Falls Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Beaver Falls.—*For description see page 144.*

Colonial Steel Company, Keystone Building, Pittsburgh. Works at Colonia, Beaver county. Telegraph address, Monaca. Built in 1901–2 and first put in operation in February, 1902; 10 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 two-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); eight 24-pot crucible steel-melting furnaces with 192 pots; product, 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 and 25,000 tons of finished rolled and forged products. Brands, "Colonial," "Red Star," and "Victor." Fuel, bituminous coal and natural gas. James W. Brown, President; George A. Howe, First Vice-President; T. H. Childs, Second Vice-President; Charles M. Brown, Secretary and Treasurer.

Damascus Steel Company; general office, Des Moines, Iowa. Works and business office, New Brighton, Beaver county, Pa. Built in 1900–1; first put in operation February 5, 1901; 2 heating furnaces, 3 hammers, (one 700, one 1,500, and one 3,500-lb.,) one 12-pot crucible steel furnace with 2 steel-melting holes; product, crucible tool steel and steel castings; annual capacity, 500 tons. Fuel, bituminous coal and manufactured gas. C. C. Taft, President and General Manager; A. M. Haggard, Secretary; J. B. Burton, Treasurer; S. R. Dawson, Superintendent. Selling agents, R. B. Logan, 325 North Harding ave., Chicago; C. Wais, 320 Goodman st., Cincinnati; Cann & Saul, Philadelphia; Watson Nye, Hartford, Conn. (Formerly operated by the New Brighton Steel Company.)

Ellwood Works, (Factory B,) Shelby Steel Tube Company, Pittsburgh. Works at Ellwood City.—*For description see page 38.*

Greenville Mill, Carnegie Steel Company, Pittsburgh. Works at Greenville.—*For description see page 12.*

Greenville Works, (Factory C,) Shelby Steel Tube Company, Pittsburgh. Works at Greenville.—*For description see page 38.*

Keystone Axle Works, W. A. Crist, owner, Johnstown. Works at Morado, (post-office address, Beaver Falls,) Beaver county. Built in 1897 and put in operation in November, 1898; one continuous heating furnace and one 48 x 96-inch roll run in a housing fitted with dies; product, circumferentially rolled car axles; annual capacity, 21,000 tons. Fuel, coal. (Formerly operated by the Keystone Axle Company.)—*Idle and for sale or lease.*

Myers (The H. M.) Company, Beaver Falls, Beaver county. Rolling mill built in 1883; 8 heating furnaces and 4 trains of 16-inch rolls; product, rolled shovel blanks, all consumed by the company in its shovel works; annual capacity, 2,000 tons. Fuel, coal and coke. Charles S. Hubbard, Manager. (Owned by the Ames Shovel and Tool Company, Boston, Mass.)—*See Elwood Plant, page 331.*

National (The) Malleable Castings Company, Sharon, Mercer county. General office, Cleveland, Ohio. 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 acid open-hearth furnaces; product, steel castings; annual capacity, about 45,000 tons. Fuel, producer gas. Alfred A. Pope, President; E. L. Whittemore, Vice-President; O. K. Brooks, Secretary and Treasurer.

New Castle Forge and Bolt Company, New Castle, Lawrence county. Rolling mill added to a bolt, nut, and rivet plant in 1904; plant contains one 26-inch plate train, 48 regenerative gas heating furnaces, 25 bolt machines, 23 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 12 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 in the manufacture of 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. J. Norman Martin, President; Frank Ryman, Vice-President and Manager; T. J. Morehead, Secretary; C. J. Kirk, Treasurer; J. F. Donahue, Manager of Sales.

New Castle Steel Works, Carnegie Steel Company, Pittsburgh. Works at New Castle.—*For description see page 14.*

New Castle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*For description see page 58.*

New Castle Works, American Steel and Wire Company of New Jersey, Chicago. Works at New Castle.—*For description see page 44.*

Pittsburgh Seamless Tube Company, Arrott Building, Pittsburgh. Works at Morado Station, Pittsburgh, Fort Wayne, and Chicago Railway, Beaver county. Built in 1899 and first put in operation December 20, 1899; 2 heating furnaces, 2 piercing mills, and 2 stands of rolls; product, steel blanks used by the company in the manufacture of seamless drawn tubes; annual capacity, 6,000 tons of blanks and 2,000,000 feet of tubes. Fuel, coal. Two open-hearth steel furnaces are projected. George H. Blaxter, President; S. M. McElroy, Treasurer; J. H. King, Superintendent; H. G. Waddie, Works Manager. (Formerly operated by the Atlantic Tube Company.)

Russell (J. C.) Shovel Company, Times Building, Pittsburgh. Works at Aliquippa, Beaver county. 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. A small machine shop is connected with the works. Fuel, coal and natural gas. J. L. Cooper, President; E. H. King, Secretary; J. J. McKee, Treasurer.

Sharon Steel Hoop Company, Sharon, Mercer county. Built in 1900–1 and first put in operation March 15, 1901; 5 heating furnaces and 4 trains of rolls (one 22-inch 3-high blooming and one 8, one 9, and one 12-inch finishing); product, billets, sheet bars, light bars, small shapes, and all sizes of steel hoops, bands, and cotton-ties; annual capacity, 70,000 tons of billets and sheet bars and 45,000 tons of finished rolled products. Four 25-gross-ton Swindell basic open-hearth steel furnaces added in 1902–3; first steel made April 24, 1903; product, ingots, billets, and sheet bars; annual capacity, 70,000 tons of ingots. Fuel, producer gas. Morris Bachman, President; John R. Hastings, Vice-President; J. W. Tedford, Secretary; A. N. Perkins, Treasurer.

Sharon Steel Works, Carnegie Steel Company, Pittsburgh. Works at Sharon.—*For description see page 15.*

Sharon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Sharon.—*Not put in operation down to April 30, 1904.* *For description see page 59.*

Sharon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Sharon.—*For description see pages 59–60.*

Sharon Works, American Steel and Wire Company of New Jersey, Chicago. Works at Sharon.—*For description see pages 44–5.*

Sharon Works, American Steel Foundries, New York. Works at Sharon.—*For description see page 96.*

Sharon Works, Republic Iron and Steel Company, Chicago. Works at Sharon.—*For description see page 87.*

Shenango Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*For description see page 60.*

South Sharon Works, Carnegie Steel Company, Pittsburgh. Works at Sharon.—*For description see page 15.*

Stewart Iron Works, Stewart Iron Company, Limited, Sharon, Mercer county. Post-office box 87. 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, Ohio; Samuel McClure, General Manager, Sharon.—*See Stewart Furnace, page 259.*

Vulcan Crucible Steel Company, Aliquippa, Beaver county. Partly built in 1901 by the Kidd Brothers and Burgher Steel Company and completed in 1902 by the Vulcan Crucible Steel Company; one crucible steel-melting furnace; 30 pots can be used at a heat; first crucible steel made in March, 1902; daily capacity, 9 tons; one 10-gross-ton acid open-hearth steel furnace added in 1903; first open-hearth steel made June 29, 1903; annual capacity, 6,000 tons; one annealing furnace, 8 heating furnaces, 2 trains of rolls, (one 10 and one 12-inch,) and 5 hammers (one 500-lb., one 750-lb., one 1,000-lb., one 2,500-lb., and one 8,000-lb.); first rolled products made in April, 1903; product, high-grade tool steel; annual capacity, 8,100 tons of rolled and 1,800 tons of forged products. Fuel, natural gas, producer gas, and coal. Brands, "Vulcan Superior," "Vulcan Extra," and "Vulcan Special." A machine shop is connected with the plant. John Caldwell, President; Samuel G. Stafford, Vice-President; W. A. Campbell, Secretary and Treasurer.

Wheatland Rolling Mill, Shenango Iron and Steel Company, Wheatland, Mercer county. Built in 1872 to roll rails; 15 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 3-high 24-inch universal plate and one 3-high double 21-inch muck); product, muck bar, skelp iron, and iron and steel universal plates; annual capacity, 20,000 tons of muck bar and 30,000 tons of skelp and plates. Fuel, bituminous coal. Samuel McClure, President, Sharon; J. L. Hukill, Vice-President, 234 Fourth ave., and A. W. Herron, Treasurer, 235 Fourth ave., Pittsburgh; Mason Evans, Secretary, Youngstown. (Formerly operated by the Continental Iron Company; acquired by the Shenango Iron and Steel Company on June 9, 1903.)

Wilkes Rolling Mill, Wilkes Rolling Mill Company, Sharon, Mercer county. Built in 1891; 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, sheet bars, and sheet iron; annual capacity, 2,500 tons of sheets and 6,000 tons of other rolled products. Fuel, bituminous coal. Brand, "Wilkes." James B. Wilkes, President and General Manager; William B. Foxall, Vice-President; M. W. Foxall, Secretary and Treasurer. Sales made by the company.

PROJECTED STEEL-CASTING PLANT.

Ambridge Plant, American Bridge Company, Pittsburgh. Contemplates erecting in the summer of 1904, at Ambridge, Beaver county, one 15-gross-ton acid open-hearth steel furnace for the manufacture of steel castings.—*See page 66.*

Number of rolling mills and steel works in the Shenango Valley and Beaver county: 30 completed and one projected. Of these one makes Bessemer steel, 7 make open-hearth steel and 2 open-hearth steel plants are projected, (one to make ingots and one to make castings,) 5 make crucible steel, and one makes blister steel.

WESTERN PENNSYLVANIA DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Western Pennsylvania, except Allegheny, Mercer, Lawrence, and Beaver Counties.

MISCELLANEOUS COKE FURNACES—15 COMPLETED AND 1 BUILDING.

Adrian Furnace, Rochester and Pittsburgh Coal and Iron Company, Du Bois, Clearfield county. One stack, 80 x 19, built in 1902-3 and first blown in August 10, 1903; four Julian Kennedy stoves, each 80 x 22 feet; fuel, Reynoldsville coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 110,000 tons. Lucius W. Robinson, President and General Manager, Punxsutawney; George L. Eaton, Secretary, and George H. Clune, Auditor and Treasurer, Rochester, N. Y.; Thomas W. Kennedy, Superintendent, Du Bois.—*Active in 1903.*

Cambria Furnaces, Cambria Steel Company, Philadelphia. Furnaces at Johnstown. Six completed stacks and one stack building; fuel, coke.—*For description see pages 135-36.*

Donora Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Donora. Two stacks; fuel, Connellsville coke.—*For description see page 6.*

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks: Furnace No. 1, 80 x 19½, built in 1790 and rebuilt in 1870, 1876, 1880, and 1900; four Whitwell stoves, two

92 x 18, one 76 x 22, and one 75 x 18. Furnace No. 2, 75 x 17, first put in blast in May, 1880, and remodeled in 1896–7; three Whitwell stoves, two 92 x 18 and one 60 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, 110,000 tons. Equipped with one pig-iron casting machine. A plant for the manufacture of silica sand is connected with the furnaces; annual capacity, 150,000 tons. Also 110 Semet-Solvay by-product and 250 bee-hive coke ovens; annual capacity, 150,000 net tons. Hazard Dickson, President, Reginald Palmer, Treasurer, and S. G. Valentine, Assistant General Manager, Dunbar; W. C. Harris, Vice-President and Secretary, Bullitt Building, Philadelphia. General sales agents, L. & R. Wister & Co., Bullitt Building, Philadelphia, and Frick Building, Pittsburgh.—*Active in 1903.*

Emporium Furnace, Emporium Iron Company, lessee, Emporium, Cameron county. 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 with an annual capacity of 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 1903.*

Punxy Furnace, Punxsutawney Iron Company, Punxsutawney, Jefferson county. 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, Superintendent, Punxsutawney. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Rebecca Furnace, Kittanning Iron and Steel Manufacturing Company, Kittanning, Armstrong county. Pittsburgh office, Farmers Bank Building. One stack, 65 x 14½, first put in operation June 20, 1880; three Massicks & Crooke stoves; fuel, coke; ore, Lake Superior; product, gray forge and foundry pig iron; annual capacity, 55,000 tons. Brand, "Rebecca."—*Active in 1903. See Kittanning Iron and Steel Manufacturing Company, page 269.*

Scottdale Furnace, Corrigan, McKinney & Co., lessees, Scottdale,

Westmoreland county. General office, 716–19 Perry-Payne Building, Cleveland, Ohio. One stack, 73 x 17, built in 1872–3 and put in blast October 14, 1873; three 75 x 19 Foote patent fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, malleable, mill, and foundry pig iron; annual capacity, 75,000 tons. Brand, "Scottdale." Selling agents, Corrigan, McKinney & Co., Perry-Payne Building, Cleveland, and Frick Building, Pittsburgh. (Formerly called Charlotte Furnace; owned by the United States Cast Iron Pipe and Foundry Company.)—*Active in 1903.*

Number of coke furnaces in Western Pennsylvania outside of Allegheny county and the Shenango Valley: 15 completed stacks and one stack building. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—41 COMPLETED AND 1 PARTLY ERECTED.

Alcania (The) Company, 503 Murtland Building, Pittsburgh. Works at Avonmore, Westmoreland county. 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; Wm. C. Weichsel, Manager. —*See Tinplate and Terne Plate Works.*

Braeburn Steel Company, Braeburn, Westmoreland county. 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); one 24-pot and one 36-pot Siemens crucible steel-melting furnace with an annual capacity of 4,000 tons of ingots; first crucible steel made in November, 1897; product, bar and tool steel; annual capacity, single turn, 7,200 tons of rolled and forged products. Fuel, coal and producer and natural gas. Brands, "B," "BS," "SBS," and "HB." William Metcalf, President; Charles Metcalf, Secretary and Treasurer; George H. Neilson, Managing Director. Selling agents, Ogden & Wallace, 577 Greenwich st., New York; Cann & Saul, 516 Commerce st., Philadelphia; F. R. Blaurock, Marine Building, Chicago; Eccles and Smith Company, San Francisco, California.

Cambria Rolling Mills and Steel Works, Cambria Steel Company, Philadelphia. Works at Johnstown, Cambria county.—*For description see page 136.*

Canonsburg Steel and Iron Works, Canonsburg, Washington county. Built in 1882; 6 sheet furnaces, 6 pair furnaces, 5 annealing furnaces, one hammer, one 3-high sheet bar train, 6 hot sheet mills, and 5 cold mills; product, steel and iron sheets for stamping, enameling, deep drawing, tinning, galvanizing, etc.; annual capacity, 15,000 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. (Formerly called the Canonsburg Works and owned and operated by the American Tin Plate Company; acquired by the present company on August 1, 1902.)

Clearfield Steel and Iron Company, Empire Building, Pittsburgh. Works at Centre, Clearfield county. Post-office and 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; Hy. L. W. Hyde, Treasurer.

Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. Built in 1879; 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 1,875 tons of ingots; product, special tool steel and refined hammered iron; annual capacity, 1,350 tons of hammered iron. Fuel, natural gas and coal.

Donora Steel Works, Carnegie Steel Company, Pittsburgh. Works at Donora.—*For description see page 10.*

Donora Works, American Steel and Wire Company of New Jersey, Chicago. Works at Donora, Washington county.—*For description see page 43.*

Duncan Chemical Company, Washington, Washington county. One 15-gross-ton acid open-hearth steel furnace built by the Washington Charcoal-Iron Tin Mills in 1900; first steel made in August, 1900; acquired by the McClure Company; sold to the Washington Foundry and Machine Company; purchased by the present owners in 1903.—*Idle and for sale.*

Eleanor (The) Iron and Steel Company, Irwin, Westmoreland county. Built in 1901–2; first put in operation early in 1902; 20 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls

(one 3-high 18-inch muck and one 3-high 12 and one 3-high 16-inch finishing); product, muck bar and skelp; annual capacity, about 22,500 tons of muck bar and 30,000 tons of skelp. Fuel, coal. John Robinsteen, President, and George Robinsteen, Vice-President, Secretary, and Treasurer, Pittsburgh.—*Idle and for sale.*

Franklin (The) Rolling Mill and Foundry Company, B. Haskell and Edward E. Hughes, Receivers, Franklin, Venango county. New York office, 253 Broadway. Built in 1902–3 and first put in operation in August, 1903; one 15-foot continuous heating furnace and one 18-inch train of rolls; product, "U" shapes for the manufacture of tripartite steel poles; annual capacity, 20,000 tons. Fuel, natural gas and coal. Plants for the manufacture of malleable and gray iron castings are connected with the works. Charles W. Mackey, President; James W. Rowland and Charles Miller, Vice-Presidents; O. D. Bleakley, Treasurer; Edward E. Hughes, Secretary; B. Haskell, General Manager; James P. Rogers, Comptroller and Purchasing Agent.

Franklin Works, American Steel Foundries, New York. Works at Franklin.—*For description see page 95.*

Griffiths Charcoal Iron Mills, Washington, Washington county. Built in 1901–2 and first put in operation October 7, 1902; 2 sheet, 2 pair, and 2 heating furnaces, one annealing furnace, one 24-inch bar mill, two 26 x 32-inch hot black plate mills, and two 20 x 34-inch cold mills; product, black plates for tinning; annual capacity, 3,600 tons; fuel, natural gas. A forge containing 6 knobbling fires and one 6,000-pound hammer is connected with the works; first blooms made in October, 1902; product, blooms made from soft steel or bundled scrap from tin mills; annual capacity, 4,500 tons; fuel, charcoal. William H. Griffiths, President; N. R. Baker, Secretary and Treasurer.—*See Tinplate and Terne Plate Works.*

Griffiths (The W. H.) Company, Incorporated, Washington, Washington county. Works at Waynesburg, Greene county. 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, black plates for tinning; annual capacity, 11,800 tons. Fuel, natural gas. William H. Griffiths, President; John A. Scott, Secretary; J. B. Rinehart, Treasurer.—*See Tinplate and Terne Plate Works.*

Humbert Works, American Sheet and Tin Plate Company, Pittsburgh. Works at South Connellsville, Fayette county.—*For description see page 56.*

Hussey-Binns Shovel Company, Home Trust Company Building, Pittsburgh. Works originally built at Pittsburgh in 1875; new

plant built in 1890–1 at Charleroi, Washington county, on the Monongahela Division of the Pennsylvania Railroad; one 24-pot crucible steel-melting furnace, 22 heating furnaces, 7 trains of rolls, 2 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, 1,350 tons of ingots. Fuel, natural gas and coal. Ralph H. Binns, President; E. B. Alsop, Vice-President; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent. (Formerly operated by Hussey, Binns & Co., Limited.)

Hyde Park Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Hyde Park, Westmoreland county.—*For description see page 56.*

Jessop Steel Company, 91 John st., New York. Works at Washington, Washington county, Pa. Built in 1901–2; first crucible steel made November 13, 1902; first rolled products made December 5, 1902; 2 regenerative heating furnaces, 3 gas heating furnaces, 3 coke and gas annealing furnaces, one coal annealing furnace, one forge fire, and 2 trains of rolls (one 20 and one 24-inch); product, sheet and saw steel; annual capacity, 5,000 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. William Jessop, President, and Sydney J. Robinson, Vice-President, Sheffield, England; W. F. Wagner, Chairman of Executive Committee, and James Jessop, Treasurer, New York; Frank T. Otley, Secretary, and James Warren, Manager, Washington, Pa.

Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown.—*For description see page 33.*

Kittanning Iron and Steel Manufacturing Company, Kittanning, Armstrong county. Pittsburgh office, 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 Furnace, page 265.*

Latrobe Works, Latrobe Steel Company, Latrobe, Westmoreland county. Main office, 1200 Girard Building, Broad and Chestnut sts., Philadelphia. New York office, No. 11 Broadway, room 1506. Built in 1888–9 and put in operation in August, 1889; 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." Marriott C. Smyth, President; C. C. Warren, Secretary; W. W. Turlay, Treasurer; Guilliaem Aertsen, General Manager; Julian Kennedy, Chief Engineer.

Leechburg Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Leechburg.—*For description see page 57.*

McClure (The) Company, 211–15 Second ave., Pittsburgh, and 301–5 Florist st., Philadelphia. Works at Washington, Washington county. Built in 1899–1900 and first put in operation in July, 1900; 2 puddling furnaces, 2 billet heating furnaces, and 9 trains of rolls, (one two-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. Thomas G. McClure, President; J. J. O'Connor, Secretary and Treasurer. Sales made by the company. (One 15-gross-ton acid open-hearth steel furnace is now owned by the Duncan Chemical Company, (see pages 267-68.) Formerly called the Washington Charcoal-Iron Tin Mills.) —*See Tinplate and Terne Plate Works.*

McInnes Steel Company, Limited, Corry, Erie county. 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 6-pot crucible steel-melting furnace with an annual capacity of 180 tons of ingots, 4 heating furnaces, and 3 hammers (one 2,-200-lb., one 1,500-lb., and one 500-lb.); product, "McInnes" hammered tool steel and McInnes "Extra" air-hardening steel; estimated annual capacity of finished products, 500 tons. Fuel, coal, coke, and natural gas. W. G. Butler, President; Alex. McInnes, Jr., Secretary; F. E. Whittlesey, Treasurer; Alex. McInnes, Sr., Superintendent.

Monessen Mill, Carnegie Steel Company, Pittsburgh. Works at Monessen.—*For description see page 14.*

Monessen Plant, Page Woven Wire Fence Company, Monessen, Westmoreland county. Built in 1899–1900 and first put in operation May 31, 1900; 2 heating furnaces, 5 trains of rolls, (two 10, one 12, one 14, and one 24-inch,) 110 wire-drawing blocks, and two 15-gross-ton Wellman basic open-hearth steel furnaces with an annual capacity of 20,000 tons of ingots; first steel made May 31, 1900; first rods rolled June 18, 1900; product, wire rods, plain and galvanized wire, staples, and woven wire fencing; annual capacity, 35,000 tons of wire rods and 35,000 tons of wire. Fuel,

bituminous coal, coke, and natural gas. Brand, "Page." A galvanizing plant is connected with the works. J. Wallace Page, President; Austin Clement, First Vice-President; Charles M. Lamb, Second Vice-President and Manager; Arthur B. Cody, Secretary; L. B. Robertson, Treasurer.

Monessen Works, Pittsburgh Steel Company, Pittsburgh. Works at Monessen, Westmoreland county.—*For description see page 142.*

National Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Monessen, Westmoreland county.—*For description see page 58.*

Pennsylvania Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington, Westmoreland county.—*For description see page 58.*

Pittsburgh Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington, Westmoreland county.—*For description see page 59.*

Saltsburg Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Saltsburg, Indiana county.—*For description see page 59.*

Scottdale Works No. 1, American Sheet and Tin Plate Company, Pittsburgh. Works at Scottdale, Westmoreland county.—*For description see page 59.*

Scottdale Works No. 2, American Sheet and Tin Plate Company, Pittsburgh. Works at Scottdale.—*For description see page 59.*

Sligo Rolling Mills, Sligo Iron and Steel Company, Connellsville, Fayette county. Branch office and warehouse, Carson st., Pittsburgh. Rebuilt and first put in operation on September 30, 1903, to continue the business of the Sligo Rolling Mills, formerly located at Pittsburgh; 24 single puddling furnaces, 2 bar, 2 guide, and 2 sheet furnaces, one gas hammer furnace, one open annealing furnace, 2 forge fires, one 3-high 20-inch muck mill with two sets, one 9-inch guide mill, one 16-inch bar mill, one 24-inch sheet mill with 2-high 66-inch roughing and 3-high 60 and 2-high 48-inch finishing mills, and one shingling hammer; product, iron and steel sheets from No. 9 to No. 20 gauge, iron and steel plates No. 8 gauge and heavier, and bar iron; annual capacity, 50,000 tons. Fuel, producer gas for heating furnaces and coal for annealing and puddling furnaces. 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.

Standard Tin Plate Company, Canonsburg, Washington county. Built in 1902–3 and first put in operation in March, 1904; 5 sheet furnaces, 2 annealing furnaces, 5 pair furnaces, 2 pickling

machines, one 3-high bar mill, 5 black plate mills, (36 x 44 and 28 x 34 inch,) and six 22-inch cold mills; product, black plates for tinning; annual capacity, 13,000 tons. Fuel, bituminous coal and natural gas. Joseph Underwood, President; W. H. Richards, General Manager; J. V. H. Cook, Treasurer; Louis Follet, Secretary.—*See Tinplate and Terne Plate Works.*

Tyler (The) Tube and Pipe Company, Washington, Washington county. New York office, 26 Cortlandt st. Built in 1890–1 and first put in operation in January, 1891; 12 forge fires, one run-out fire, 5 heating furnaces, 3 trains of rolls, (one 16 and two 18-inch,) and 2 hammers; product, charcoal blooms and charcoal skelp iron used by the company in the manufacture of boiler tubes; annual capacity, 21,000 tons. Fuel, natural gas and charcoal. Brands, "Algerite," "Tyler," "Diamond T," and "Diamond T Special." N. E. Whitaker, President; L. F. Doyle, Vice-President; C. A. Bumpus, Treasurer; Charles Stratman, General Superintendent.

United Engineering and Foundry Company, Farmers Bank Building, Pittsburgh. Works at Vandergrift, Westmoreland county. 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, 9,000 tons. Fuel, natural gas. Isaac W. Frank, President; C. H. Booth, First Vice-President; F. A. Campbell, Second Vice-President; Charles E. Satler, Secretary; Edward Kneeland, Treasurer.

Vandergrift Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Vandergrift.—*For description see pages 60–1.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg, Greene county. Built in 1900 and first put in operation October 16, 1900; 4 single puddling furnaces, (idle,) 3 billet heating furnaces, 6 sheet and pair furnaces, 6 annealing furnaces, 7 hot mills, (one 24-inch sheet bar, one 26 x 42 and one 26 x 38-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. Fuel, natural gas. W. H. Griffiths, President; H. B. Duncan, Secretary; T. Ross, Treasurer; W. H. Baker, General Manager.—*See Tinplate and Terne Plate Works.*

West Leechburg Steel Company, Farmers Bank Building, Pittsburgh. Works at West Leechburg, Armstrong county. 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. J. W. Kirkpatrick, President; F. R. Kenyon, Vice-President and General Manager; James Lippincott, Secretary; J. L. Kirkpatrick, Treasurer. (Formerly called the West Leechburg Steel and Tin Plate Company.)

Westmoreland Steel Company, 424 Fourth ave., Pittsburgh. Works at Huff Station, near Greensburg, Westmoreland county. Built in 1889–90 and rebuilt in 1900; one 24-pot crucible steel-melting furnace with an annual capacity of 2,400 tons of ingots; 5 heating furnaces, one annealing furnace, 5 forge fires, 7 steam hammers, (one 100, one 400, one 600, one 800, one 1,200, one 2,000, and one 8,000-lb.,) and 2 trains of rolls (one 10 and one 12-inch); product, forgings, tool steel, die blocks, high-grade steel bars, special steel, etc.; annual capacity, 2,000 tons of forged and 6,000 tons of rolled products. Fuel, bituminous coal. E. Kaufman, President; S. R. Wilson, Vice-President; J. H. K. Burgwin, Treasurer; Robert M. Straub, Secretary; Charles W. Wright, Mill Manager.

PARTLY-ERECTED WORKS—1.

Eleanor (The) Iron and Steel Company commenced the erection of an open-hearth steel plant and a rolling mill at Butler, Butler county, in the summer of 1903; foundations for furnaces built; work suspended. Inquiries concerning the enterprise may be addressed to the Butler Land and Improvement Company, Butler.

Number of rolling mills and steel works in Western Pennsylvania outside of Allegheny County, the Shenango Valley, and Beaver County: 41 completed and one partly erected. Of these one makes Bessemer steel, 9 make open-hearth steel, one open-hearth steel plant is partly erected, one open-hearth steel plant is projected, and 6 make crucible steel.

SUMMARY FOR PENNSYLVANIA.

Total number of furnaces in Pennsylvania: 155 completed stacks, 4 stacks building, one stack partly erected, and one stack rebuilding. Of these 89 use coke alone, 4 coke stacks are being built, and one coke stack is being rebuilt; 57 stacks use anthracite coal and coke mixed and one anthracite coal and coke stack is partly erected; 4 stacks use anthracite coal alone, and 5 stacks use charcoal.

Total number of rolling mills and steel works in Pennsylvania: 248 completed, 2 building, one partly erected, and 2 projected. Of these 12 can make Bessemer steel, 2 make Tropenas steel, one

makes Bookwalter steel, 67 can make open-hearth steel, one open-hearth steel plant is being built, one open-hearth steel plant is partly erected, and 5 open-hearth steel plants are projected; 29 make crucible steel, 7 make blister steel, one makes steel by a special process, and one makes McHaffie steel.

Number of pig and scrap iron bloomaries in Pennsylvania which make hammered bars, blooms, billets, etc., for sale: 6.

DELAWARE.

ROLLING MILLS AND STEEL WORKS—7 COMPLETED, 1 BUILDING, AND 1 REBUILDING.

Baldt (The) Steel Company, New Castle, New Castle county. Built in 1903–4; to be put in operation in July, 1904; three 25-gross-ton Siemens-Martin acid open-hearth steel furnaces; product, all kinds of steel castings; annual capacity, from 15,000 to 20,000 tons. Fuel, bituminous coal and manufactured gas. Frederick Baldt, President; William C. Turner, Vice-President; Rodney Thayer, Secretary and Treasurer.

Brylgon Steel Casting Company, New Castle, New Castle county. Building works at New Castle to be equipped with two 2-gross-ton Bookwalter converters; product, to be steel castings; estimated annual capacity, 3,000 tons. Fuel to be used, anthracite and bituminous coal, coke, and oil. Works may be completed in July, 1904. Two additional 5-gross-ton Bookwalter converters with an annual capacity of 10,000 tons of castings are projected. Andrew Bryson, President and Treasurer; Charles W. Constantine, Vice-President; Norman L. McElligott, Secretary; Selden S. Deemer, Superintendent.—*Also operates a steel-casting plant at Reading, Pa., which will be abandoned.* *See page 221.*

Diamond (The) State Steel Company, Wilmington, New Castle county. Philadelphia office, Real Estate Trust Building; New York office, 29 Broadway. 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, 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. A gray iron foundry, with an annual capacity of 6,000 tons, and machine shops are connected with the works. H. T. Wallace, President; W. H. Wallace, Secretary; George Thomas, 3d, Manager Steel Department; George W. Todd, Manager Mills and Shops.

Johnson Forge Company, Wilmington, New Castle county. Built in 1889; destroyed by fire in October, 1903; now being rebuilt; 7 puddling and 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. John R. Johnson, President; John Hare, Treasurer.—*Now being rebuilt.*

Marshallton Iron and Steel Company, Incorporated, Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884 and 1889; 2 double puddling furnaces, 3 grate heating furnaces, one reverberatory heating furnace, 2 box annealing furnaces, and 3 trains of rolls (one 21 x 40, one 20 x 40, and one 22 x 40-inch); steam and water power; product, sheet iron and sheet steel; specialty, corrugated iron; annual capacity, 3,000 tons. Fuel, anthracite and bituminous coal. Brands, "R. G." and "Star Cleaned." A factory for the manufacture of drip pans, roasters, elbows, etc., added in 1889; daily capacity, 2 tons. A small machine shop is also connected with the works. Frederick Bringhurst, President; James W. Wilson, Vice-President; J. A. Robinson, Secretary and Treasurer; James Clark, Superintendent. Sales made by the company.

Minquas Iron Works, McCullough Iron Company, Equitable Building, Wilmington, New Castle county. Built in 1873 and put in operation in 1875; one heating, 4 sheet, and 5 annealing furnaces, 7 trains of rolls, (one 23-inch bar and two 22 and two 26-inch sheet, all hot, and two 22-inch sheet, cold,) and one hammer; product, fine sheet steel, black and galvanized, and "Harvey's patent cleaned" sheet iron; annual capacity, triple turn, 10,000 tons of sheets. Fuel, bituminous 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, New Castle county. 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. Mendinhall, President; E. Mendinhall, Treasurer; H. F. Weldin, Secretary. Sales made by the company.

Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington, New Castle county. First mill built in 1845, second in 1870, and another 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, all consumed in the rolling mills; annual capacity, single turn, 3,000 tons. Fuel, bituminous coal in the rolling mills and charcoal in the forge. W. Hastings, President; W. P. Hastings, Secretary and Treasurer.

Number of rolling mills and steel works in Delaware: 7 completed, one building, and one rebuilding. Of these 2 can make open-hearth steel and one plant to make steel by the Bookwalter process is being built. There are no blast furnaces in Delaware.

MARYLAND.

COKE FURNACES—5.

Deborah Furnace, Blue Mountain Iron and Steel Company, 615–18 Hale Building, Philadelphia. Roger McSherry and M. G. Urner, of Frederick, Md., and L. R. Waesche, of Catoctin, Md., Receivers. Furnace at Catoctin Furnace, Frederick county, Maryland. One stack, 60 x 13, built in 1873–4 and enlarged in 1900; two Raymond & Campbell stoves; fuel, Connellsville coke; ore, local hematite; product, foundry and forge pig iron; annual capacity, 15,000 tons. Brands, "Catoctin" and "Blue Mountain." Charles Barnum, President; C. H. White, Vice-President; H. C. Terry, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Maryland Steel Company, Sparrows Point, Md., and Philadelphia, Pa. Furnaces at Sparrows Point. Four stacks; fuel, coke.—*For description see page 121.*

Number of coke furnaces in Maryland: 5 stacks.

CHARCOAL FURNACES—1.

Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George county. One stack, 36 x 8¾, 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; Geo. T. Johnson & Co., 302 Pennsylvania Building, Philadelphia; Robinson & Orr, 119 Wood st., Pittsburgh.—*Active in 1903.*

Number of charcoal furnaces in Maryland: one stack.

Total number of furnaces in Maryland: 6 stacks. Of these 5 use coke alone for fuel and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—6.

Baltimore Rolling Mill Company, Thomas C. Weeks, Receiver, 120 East Lexington street, Baltimore, Maryland. Works at Canton, Baltimore county. 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, bituminous coal. Harry Wehr, President; John C. Brown, Vice-President and Treasurer. Sales made by the company.

Cumberland Rolling Mill, Schonthal Iron and Steel Company, lessee, Cumberland, Allegany county. General sales office, Columbus, Ohio. Built in 1870 as an iron rail mill; bar mill added in 1873; 15 double puddling furnaces, (idle,) 10 heating furnaces, 5 trains of rolls, (one 9, one 12, one 16, and two 23-inch,) and one hammer; product, renewed light steel rails, 16, 20, 25, 30, 35, and 40 lbs. to the yard; annual capacity, 25,000 tons of renewed rails. Fuel, bituminous coal. Joseph Schonthal, President; Bela E. Schonthal, Secretary, Treasurer, and General Manager. Sales made by the company. (Owned by the Baltimore and Ohio Railroad Company.)

Maryland (The) Rail Company, Cumberland, Allegany county. New York office, 1123 Broadway. Black plate mill added to a rolling mill in 1892 and first black plates made in 1893; acquired by the present owners in 1902 and changed to a rail mill in that year; first rails rolled October 1, 1902; 4 heating furnaces and 3 stands of 3-high 16-inch rolls; product, light rerolled steel rails; annual capacity, 20,000 tons. Fuel, bituminous coal. H. H. Dickey, President; L. C. Millholland, Vice-President; H. E. Weber, Treasurer; William C. Dickey, Secretary. (Formerly called the Cumberland Works and operated by the American Tin Plate Company.)

Maryland Steel Company, Sparrows Point, Maryland, and Philadelphia, Pa. Works at Sparrows Point.—*See pages 121-22.*

Taylor (N. and G.) Company, Mariner and Merchant Building, Third and Chestnut streets, Philadelphia, Pa. Two works at Cumberland, Allegany county, 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 enlarged in 1889, 1892, 1902–3, and 1904; open-hearth steel plant contains two 25-gross-ton basic furnaces with an annual capacity of 35,000 tons of ingots, one continuous ingot heating furnace, and one 3-high bar mill for breaking down ingots into sheet bars; sheet department contains the necessary heating and annealing furnaces and 2 jobbing mills, with one stand of 26-inch roughing and 2 stands of 26-inch finishing rolls, and one 26-inch slabbing mill; annual capacity, about 15,000 tons of sheets; 2 harrow-disk shops, with an annual capacity of 5,000 tons of harrow disks and coulters from 8 to 26 inches in diameter, are connected with the works; also an iron foundry with an annual capacity of about 3,000 tons of gray iron castings; also a machine shop. Fuel for both works, bituminous coal. (Open-hearth steel plant and sheet mills formerly operated by the Maryland Sheet and Steel Company; black plate mills formerly owned by the Maryland Tin Plate Company.)—*See Tinplate and Terne Plate Works in Pennsylvania.*

Number of rolling mills and steel works in Maryland: 6. Of these one makes Bessemer steel and one makes open-hearth steel.

PIG AND SCRAP IRON 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 runout attached; product, charcoal blooms for boiler tubes, used by the Tyler Tube and Pipe Company, of Washington, Pa.; annual capacity, 8,000 tons. Fuel, charcoal. Makes charcoal in pits. N. E. Whitaker, President; A. C. Whitaker, Secretary. (Owned by the Whitaker Iron Company, Wheeling, W. Va.)

Number of pig and scrap iron bloomaries in Maryland: one.

DISTRICT OF COLUMBIA.

STEEL WORKS—1.

Naval Gun Factory, United States Navy Yard, Washington. One 2-gross-ton Tropenas steel converter built in 1903; first steel made April 16, 1903; product, steel castings for ordnance for the Navy; annual capacity, 300 tons. Fuel, coke. E. C. Pendleton, Captain U. S. Navy, Superintendent; J. Turner Moore, Master Steel Maker.

Number of Tropenas steel works in the District of Columbia: one.

VIRGINIA.

COKE FURNACES—22 FURNACES COMPLETED AND 1 FURNACE BUILDING.

Alleghany Furnace, Alleghany Ore and Iron Company, Clifton Forge. Branch office, Pennsylvania Building, corner Fifteenth and Chestnut sts., Philadelphia. Furnace at Iron Gate, Virginia. One stack; fuel, coke.—*For description see page 179.*

Bristol Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnace in Washington county, Virginia. One stack; fuel, coke.—*For description see page 175.*

Buena Vista Furnace, Alleghany Ore and Iron Company, Clifton Forge. Furnace at Buena Vista. One stack; fuel, coke.—*For description see page 179.*

Crozer Furnaces, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnaces at Roanoke, Virginia. Two stacks; fuel, coke.—*For description see page 175.*

Dora Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnace at Pulaski City, Virginia. One stack; fuel, coke.—*For description see page 175.*

Gem Furnace, Alleghany Ore and Iron Company, Clifton Forge. Furnace at Shenandoah. One stack; fuel, coke.—*See page 179.*

Graham Furnace, The Graham Iron Company, lessee, Graham. One stack, 70 x 15, built in 1890 and blown in December 12, 1891; 3 Whitwell stoves; fuel, Pocahontas coke; ores, local hematite and Lake Superior; product, foundry and basic open-hearth pig iron; annual capacity, 40,000 tons. Brand, "Graham." Frank P. Howe, President, 230 Drexel Building, Philadelphia; Frank Samuel, Secretary and Treasurer, 209 Harrison Building, Philadelphia; L. P. Ross, General Manager, Graham, Va. (Formerly operated and now owned by the Virginia Iron, Coal, and Coke Company.)—*Active in 1903.*

Ivanhoe Furnace, New River Mineral Company, F. M. Masters, Trustee, Ivanhoe Furnace P. O., Wythe county. 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 two-pass Foote stove, 16 x 65, and two Whitwell stoves; fuel, Pocahontas coke; ores, local brown hematite and limonite; product, foundry and forge pig iron; annual capacity, 25,000 tons. Brand, "Ivanhoe." A small foundry is connected with the furnace. Edwin Einstein, President, 524 Fifth ave., Jordan L. Mott, Vice-President, 2122 Fifth ave., and J. T. Pearson, Secretary and Treasurer, 49 Cliff st., New York; F. M. Masters, Manager, at the works. Selling agents, N. S. Bartlett & Co., Boston and New York.—*Active in*

1903. Sold on June 14, 1904, subject to confirmation by the court, to Jordan L. Mott and Edwin Einstein, of New York.

Longdale (The) Iron Company, Longdale, Alleghany county. Two stacks: No. 1, (formerly Lucy Selina,) 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; John L. Wilson, Treasurer, 608 Chestnut st., Philadelphia. Sole sales agents, Matthew Addy & Co., Cincinnati, Chicago, St. Louis, Pittsburgh, New York, and Philadelphia.—*Active in 1903.*

Low Moor Iron Company of Virginia, Low Moor, Alleghany county. 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; 4 Whitwell and 3 Foote stoves; fuel, New River coke made at the furnaces; 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, Virginia; 51 ovens at Covington, Virginia; and 149 ovens at Kay Moor, West Va. A machine shop for the use of the company is connected with the furnaces. E. C. Means, President and General Manager, John F. Winslow, Assistant Secretary, and S. G. Cargill, Assistant Treasurer, Low Moor, Virginia; Frank Lyman, Vice-President, Secretary, and Treasurer, 31 Burling Slip, New York. Selling agents: for the East, Dalton, Nash & Co., 76 William st., New York; for the West, Thomas A. Mack, Traction Building, Cincinnati, and H. R. Durkee, Rookery Building, Chicago.—*Active in 1903.*

Max Meadows Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Furnace at Max Meadows, Va. One stack; fuel, coke.—*For description see page 176.*

Princess Furnace, Princess Iron Company, Wrightsville, Pa. Furnace at Glen Wilton, Botetourt county, Virginia. One stack, 60 x 12½, built in 1883–4; one Whitwell and two 2-pass Foote stoves, 15 x 60; fuel, New River coke; ore, hematite mined on the furnace property; product, soft, strong, and very fluid foundry pig

iron; annual capacity, 15,000 tons. Brand, "Princess." D. S. Cook, President and General Manager, Wrightsville, Pa.; Wilton Cook, Secretary and Treasurer, Glen Wilton, Virginia. Selling agents, George T. Johnson & Co., Pennsylvania Building, Philadelphia, and Matthew Addy & Co., Cincinnati.—*Active in 1903.*

Pulaski Iron Company, Pulaski City, Pulaski county. Main office, 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, which have an annual capacity of about 120,000 tons. A. J. Dull, President, Harrisburg, Pa.; Edward P. Borden, Vice-President, and Horace L. Haldeman, Secretary and Treasurer, Philadelphia.—*Active in 1903.*

Radford-Crane Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Furnace at Radford, Va. One stack; fuel, coke. —*For description see page 176.*

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 Greek; fuel, Pocahontas coke; product, foundry and mill pig iron; annual capacity, 4,000 tons. Address all communications to Richard Wood, 400 Chestnut st., Philadelphia.—*Active for a short time in 1900.*

Union No. 1 and Union No. 2 Furnaces, Union Iron and Steel Company, New York. Furnaces at Big Stone Gap, Va. One completed stack and one stack building; fuel, coke.—*See page 106.*

Victoria Furnace, Chapman Iron, Coal, and Coke Company, Incorporated, 80 Broadway, New York. Furnace at Goshen, Rockbridge county, Virginia. One stack, 75 x 17, built in 1882–3; first put in blast May 1, 1883; rebuilt in 1892 and 1902; 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 owned by the company; product, foundry and basic pig iron; annual capacity, 50,000 tons. Brands, "Victoria" and "Goshen." Elverton R. Chapman, President, Anderson Fowler, Vice-President, Mellville D. Chapman, Secretary, and Arthur A. Fowler, Treasurer, 80 Broadway, New York; Joseph L. Hunter, General Manager, Goshen, Virginia. Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly called Rockbridge Furnace; also called Goshen Furnace; formerly operated by the Empire Steel and Iron Company; later by the Alleghany Ore and Iron Company.)—*Active in 1903.*

West End Furnace, West End Furnace Company, 326 Chestnut st., Philadelphia. Furnace at Roanoke, Roanoke county, Virginia. One stack, 82 x 17, built in 1890 and blown in December 1, 1890; four Massicks & Crooke stoves; fuel, Pocahontas coke; ore, brown hematite from Southwest Virginia; product, foundry pig iron; annual capacity, 48,000 tons. Brand, "Roanoke." H. T. Dechert, President, Philadelphia; Donald McLeod, Secretary, Rutledge, Pa.; James B. Bailey, Treasurer, Harrisburg. Sales made by the company. (Formerly called the Roanoke Furnace.)—*Active in 1903.*

Number of coke furnaces in Virginia: completed, 22; building, one.

CHARCOAL FURNACES—4.

Fosters Falls Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnace at Foster's Falls, Virginia. One stack; fuel, charcoal.—*For description see pages 175–76.*

Liberty Furnace, Monarch Blast Furnace 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." A 3-foot gauge railroad, owned by the company, connects Liberty Furnace with Edinburg, 12 miles distant. John Gaffney, President; James Gaffney, Vice-President; James B. Brown, Secretary; John Gaffney, Jr., General Manager; John P. Marshall, Superintendent. Selling agents, L. & R. Wister & Co., Bullitt Building, Philadelphia. Charcoal pits and kilns are connected with the furnace.—*Blown in on April 18, 1904, after an idleness of several years.*

Reed Island Furnace, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Furnace in Pulaski county, Virginia. One stack; fuel, charcoal.—*For description see page 176.*

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, A. McLeod, Secretary, and C. F. Wollaston, Treasurer, Wilmington; J. H. Wissler, Manager, Rural Retreat.—*Active in 1903.*

Number of charcoal furnaces in Virginia: 4 stacks.

ELECTRIC FURNACES—2.

Willson (The) Aluminum Company, 97–103 Cedar st., New York. Furnaces at Holcomb Rock, Bedford county, Virginia. Two electric furnaces started in 1892; electricity generated by water power; product, ferro-silicon, ferro-chromium, ferro-titanium, and other ferro alloys. J. Turner Morehead, President, and George F. Seward, Vice-President and Secretary, New York; George O. Seward, Manager of works in Virginia and West Virginia.—*Active in 1903. See Electric Furnaces in West Virginia, page 285.*

Number of electric furnaces in Virginia: 2.

Total number of blast furnaces in Virginia: 26 completed and one building. Of these 22 use coke, one coke stack is being built, and 4 use charcoal. In addition there are 2 electric furnaces.

ROLLING MILLS AND STEEL WORKS—6.

Crescent Horse Shoe and Iron Works, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Works at Max Meadows, Virginia. —*For description see page 176.*

Iron (The) Company of America, Roanoke, Roanoke county. Built in 1891–2 and put in operation in February, 1892; one hammer, one crusher, one double scrap furnace, 15 double puddling furnaces, and 2 trains of rolls; product, common and high-grade bar iron; will also make planished iron by a special process. Fuel, coal and manufactured gas. Aaron Loucks, Chairman; L. H. Leitzell, Secretary; D. S. Loucks, Treasurer; Richard Robinson, General Manager. (Formerly called the Roanoke Iron Works.)

Manchester Rolling Mill, Richmond Standard Steel Spike and Iron Company, Richmond. Works at Manchester, Chesterfield county, Virginia. Built in 1888–9 and put in operation in April, 1889; one double gas heating furnace, 3 reheating furnaces, one forge fire, 3 automatic spike machines, 2 hand spike machines, and one 9-inch train of rolls; water power; product, bar iron, used in the manufacture of railroad and boat spikes; annual capacity, 7,200 tons. Fuel, bituminous coal. An iron foundry is connected with the works. Corbin Warwick, President and General Manager.

Newport News Shipbuilding and Dry Dock Company, No. 1 Broadway, New York. Works at Newport News, Warwick county, 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. The company also builds all kinds of iron and steel vessels. C. B. Orcutt, President, and I. E. Gates, Treasurer, New York; W. A. Post, General Superintendent, Newport News.

Old Dominion Nail Works, Old Dominion Iron and Nail Works

Company, Richmond, Henrico county. 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, including 2 gas heating furnaces with Siemens producers, one squeezer, 6 trains of rolls, (one 9, two 10, two 18, and one 20-inch,) and 137 cut-nail machines. (Bessemer steel plant built in 1887; two 3-gross-ton converters and a blooming mill with an annual capacity of 60,000 tons; first blow made October 10, 1887; idle since 1888.) Works operated by 9 turbine water wheels and by steam generated from waste heat of puddling furnaces; product, muck bar, iron and steel cut nails and 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, 75,000 tons of iron and steel exclusive of steel plant and 300,000 kegs of cut nails. Fuel, anthracite and bituminous coal, coke, and producer gas. Brand, "Old Dominion" for cut nails, bar iron, and horse and mule shoes. E. L. Bemiss, Vice-President; H. R. Wayt, Secretary; J. B. Carter, Treasurer. All sales made by the company.—*See Tinplate and Terne Plate Works.*

Tredegar Iron Works, The Tredegar Company, Richmond, Henrico county. Built in 1836; 9 coal and 7 gas heating furnaces, one scrap furnace, 7 trains of rolls, and 11 hammers; steam and water power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, links and pins, car iron, and horseshoes; annual capacity, 45,000 tons. Fuel, bituminous coal and coke. 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. Selling agents, Crerar, Adams & Co., Chicago.

Number of rolling mills and steel works in Virginia: 6. Of these one makes Tropenas steel and one has an idle Bessemer steel plant that has not been in operation since 1888.

WEST VIRGINIA.

COKE FURNACES—4.

Belmont Furnace, Wheeling Steel and Iron Company, Wheeling. One stack; fuel, coke.—*For description see page 153.*

Riverside Furnaces, (Riverside Department,) National Tube Company, Pittsburgh. Furnaces at Benwood, West Virginia. Two stacks; fuel, coke.—*For description see pages 34–5.*

Top Mill Furnace, Wheeling Steel and Iron Company, Wheeling. One stack; fuel, coke.—*For description see page 153.*

Number of coke furnaces in West Virginia: 4 stacks.

ELECTRIC FURNACES—3.

Willson (The) Aluminum Company, 97–103 Cedar st., New York. Furnaces at Glen Ferris, (post-office address, Kanawha Falls, Fayette county,) West Virginia. Three electric furnaces started in 1901; electricity generated by water power; product, ferro-chrome, ferro-silicon, ferro-tungsten, and other ferro alloys. George O. Seward, Manager of Works; T. R. Ragland, Resident Manager.—*Active in 1903. See Electric Furnaces in Virginia, page 283.*

Number of electric furnaces in West Virginia: 3.

Total number of furnaces in West Virginia: 4 coke stacks and 3 electric furnaces. There are no charcoal furnaces in West Virginia.

ROLLING MILLS AND STEEL WORKS—16 COMPLETED, 2 BUILDING, AND 1 PROJECTED.

Belmont Works, Wheeling Steel and Iron Company, Wheeling.—*For description see page 153.*

Benwood Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood.—*For description see pages 153–54.*

Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Virginia.—*For description see pages 54–5.*

Crescent Iron Works, (Whitaker Department,) Whitaker-Glessner Company, Wheeling.—*For description see page 155.*

Fairmont Steel Company, Fairmont, Marion county. 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 12 to 50 pounds inclusive; annual capacity, 30,000 tons. Steam and compressed air. Fuel, natural gas. John A. Clark, President; Clyde S. Holt, Vice-President; Walton Miller, Treasurer; E. A. Billingslea, Secretary.

Follansbee Brothers Company, Liberty and Short sts., Second and Third aves., Pittsburgh, Pa. Building works at Mahans, Brooke county, (post-office address, Wellsburg,) West Virginia. Construction commenced in 1902; works will probably be completed in the summer of 1904; to be equipped with 8 heating furnaces, 7 annealing furnaces, 3 sheet mills, (2 hot and one cold,) and 11 black plate mills (6 hot and 5 cold); product, black plates for tinning; annual capacity, 20,000 tons. Fuel, natural and

manufactured gas. Also makes roofing products, eave troughs, conductor pipe, and tin and terne plates. B. G. Follansbee, President; William U. Follansbee, Secretary and Treasurer; William Banfield, Manager. Sales made by the company.—*See Tinplate and Terne Plate Works in Pennsylvania and West Virginia.*

Jackson Iron and Tin Plate Works, The Jackson Iron and Tin Plate Company, Clarksburg, Harrison county. Security Trust Company, Trustee, Wheeling. Built in 1901–2 and put in operation in June, 1902; 5 single and 3 double heating furnaces, 8 pair furnaces, 2 single annealing furnaces, one 3-high 9-inch bar mill, 8 hot black plate mills, (26 and 28-inch,) and 4 stands of 28 x 32-inch cold mills; product, black plates for tinning; also long sheets; annual capacity, 20,000 tons. Fuel, natural gas.—*Idle; advertised to be sold on July 9, 1904. See Tinplate and Terne Plate Works.*

La Belle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wheeling, W. Va.—*For description see page 57.*

Morgantown Tin Plate Company, Frank P. Corbin, Trustee, Morgantown, Monongalia county. Partly built by the Rolling Mill Company of America in 1902; practically completed by the Morgantown Tin Plate Company in 1903–4; not put in operation down to May 15, 1904; 6 pair furnaces, 6 heating furnaces, one annealing furnace, six 32-inch hot mills, and four 30-inch cold mills; product, black plates for tin and terne plates; estimated annual capacity, 12,000 tons of black plates. Fuel, coal, coke, and natural gas. Also equipped to make tin and terne plates. Several basic open-hearth steel furnaces may be added. —*For sale. See Tinplate and Terne Plate Works.*

Ohio Valley Steel and Foundry Company, Robert Miller, Receiver, Empire Building, Pittsburgh, Pa. Building works at Paden City, Wetzel county, W. Va., to be equipped with 2 Siemens open-hearth steel furnaces (one 20-gross-ton acid and one 25-gross-ton basic); product, to be steel castings for railroad work; estimated annual capacity, 8,000 tons of acid and 10,000 tons of basic castings. Fuel, natural gas. The works will probably be completed and in operation in August, 1904. One sheet bar mill and 3 sheet mills may be added. C. G. Robinson, President; Henry Watson, Treasurer; C. L. Wooldridge, Secretary.

Parkersburg Iron and Steel Company, Parkersburg, Wood county. 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, 18,000 tons. Fuel, coal and natural gas. H. H. Nieman, President; H. S. Duncan and A. E. Nieman, Vice-Presidents; A. H. Geilfuss, Secretary; L. A. Meyran, Treasurer.

Riverside Skelp Mills, (Riverside Department,) National Tube Company, Pittsburgh. Works at Benwood, W. Va.—*See page 36.*

Riverside Steel Works, (Riverside Department,) National Tube Company, Pittsburgh. Works at Benwood, W. Va.—*See page 36.*

Top Mill, Wheeling Steel and Iron Company, Wheeling. Works at Wheeling.—*For description see page 154.*

Union Rail Company, Huntington, Cabell county. Pittsburgh office, Farmers Bank Building. Built in 1902 by the Huntington Tin and Planished Plate Company, (Incorporated,) and equipped with 6 hot and 4 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, 2 scrap furnaces, one 18-inch train of 3-high rolls, and one 800-lb. hammer; first rail rolled April 11, 1904; product, steel rails from 16 pounds to 50 pounds to the yard, splice bars, and bar iron and steel; annual capacity, 35,000 tons. Also makes frogs and switches for light rails. Fuel, coal and natural gas. Brand, "Union." A. F. Baumgarten, President and Manager; D. J. Baumgarten, Vice-President and Treasurer; L. A. Pollock, Secretary. Selling agents, A. F. Baumgarten & Brother, Farmers Bank Building, Pittsburgh.

West Virginia Malleable Iron Company, Point Pleasant, Mason county. One 20-gross-ton acid open-hearth steel furnace built in 1903; also 6 annealing furnaces; product, high-grade open-hearth malleable iron castings, but steel castings could be made; daily capacity, 25 tons of malleable castings. Fuel, bituminous coal and coke. J. S. Spencer, President; Homer Smith, Vice-President; C. R. McCulloch, Secretary; T. Stribling, Treasurer; R. C. Kyle, General Manager; E. H. Woelffel, Superintendent.

Wheeling Steel Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood, Marshall county.—*For description see page 154.*

Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, West Virginia.—*For description see page 152.*

PROJECTED ROLLING MILL—1.

Kenton Iron and Steel Company, Covington, Kentucky. Will erect works at Mason City, Mason county, West Virginia, to be equipped with 4 single puddling furnaces, 2 scrap heating furnaces, 2 finishing furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one 5,000-lb. hammer; product, bar iron and steel; annual ca-

pacity, 15,000 tons. Brand, "Kenton." Fuel, coal. James W. Arnold, President and General Manager, Mason City, West Virginia; Harry Ankenbaur, Vice-President, and John Ankenbaur, Secretary and Treasurer, 118 East Front st., Cincinnati, Ohio.

Number of rolling mills and steel works in West Virginia: 16 completed, 2 building, and one projected. Of these 2 make Bessemer steel, one has an open-hearth steel plant, one open-hearth steel plant is being built, and one open-hearth steel plant is projected.

KENTUCKY.

COKE AND BITUMINOUS COAL AND COKE FURNACES—8.

Ashland Furnaces, Ashland Iron and Mining Company, Ashland, Boyd county. Three stacks, two owned and one leased, all at Ashland: No. 1, 62 x 16, first blown in August 31, 1869; No. 2, 64 x 16, built in 1887; and No. 3, 66 x 16, (leased from the Norton Iron Works,) built in 1873, blown in February 16, 1874, and remodeled in 1877. Nine Whitwell stoves, two Massicks & Crooke stoves, and one Foote stove; fuel, raw coal and coke; ores, Bath county and Lake Superior; product, American-Scotch, (high-silicon,) Bessemer, and ferro-silicon pig iron; total annual capacity, 50,000 tons. Brand, "Ashland." No. 1 will be rebuilt in 1904 and its size increased to 75 x 17. Connected with the furnaces are 66 bee-hive coke ovens with an annual capacity of 25,000 net tons. Robert Peebles, President; Frank Coles, First Vice-President; K. L. Butler, Second Vice-President; Frank B. Moore, Secretary and Treasurer; A. N. Richardson, Auditor; Elton B. Hull, Superintendent. Selling agents, Matthew Addy & Co., St. Louis; M. A. Hanna & Co., Cleveland; Pickands, Brown & Co. and H. R. Durkee, Chicago; John S. Slagle, 804 Penn Building, Pittsburgh; Walter Wallingford & Co. and The Domhoff and Joyce Company, Cincinnati. (Formerly operated by the Ashland Coal and Iron Railway Company.)—*Active in 1903.*

Grand Rivers Furnaces, Hillman Land and Iron Company, Grand Rivers, Livingston county. 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, "Grand Rivers." John W. Harrison, President, 400 Columbia Building, and E. H. Simmons, Vice-President and Treasurer, and G. W. Simmons, Secretary, Ninth and Spruce sts., St. Louis, Missouri.—*Active in 1903.*

Paducah Furnace, E. C. Lackland, Trustee, St. Louis, Mo. Furnace at Paducah, McCracken county, Kentucky. One stack, 70 x 14,

built in 1889–90; first blown in in the spring of 1900; two Massicks & Crooke stoves; fuel, coke; annual capacity, 30,000 tons. (Formerly leased by S. Frank Eagle; later leased and operated by the Kentucky Iron Company, which is now in the hands of a receiver, and which gave up its lease on November 30, 1903. The furnace is owned by R. J. Lackland, J. W. Harrison, and K. M. and C. R. Howard.)—*Active in 1903. Idle and for sale. Address E. C. Lackland, Trustee, Laclede Building, St. Louis, Mo.*

Watts Furnaces, Virginia Iron, Coal, and Coke Company, Bristol, Tenn. Furnaces at Middlesborough, Kentucky. Two stacks; fuel, coke.—*For description see page 176.*

Number of coke and bituminous coal and coke furnaces in Kentucky: 8 stacks. Of these 5 use coke alone and 3 use raw coal and coke mixed. There are no active charcoal furnaces in Kentucky.

ROLLING MILLS AND STEEL WORKS.—10.

Ashland Sheet Mill Company, Incorporated, Ashland, Boyd county. 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 annealing 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 two pots and an annual capacity of 15,000 tons is connected with the works. I. A. Kelly, President; T. J. McCullough, Vice-President; L. R. Putnam, Secretary; George McCullough, Treasurer.

Ashland Steel Company, Incorporated, Ashland, Boyd county. 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, 150,000 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, 941 North Second st., St. Louis, Mo. 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. (Not in operation.) Tennessee Rolling Mills, at Louisville, Jefferson county, (formerly called the Kentucky Rolling Mill,) 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. L. P. Ewald, President and General Manager.—*Louisville Works only in operation.*

Licking Iron Works, Licking Rolling Mill Company, Incorporated, Covington, Kenton county. Built in 1845 and overhauled in 1895; 6 double puddling, 5 Lauth heating, and 2 scrap furnaces, one 5-ton steam hammer, one 8-inch mill, one 12-inch mill, two 16-inch mills, and two 24 x 36-inch sheet mills, all hot, and two 24 x 38-inch cold mills; also one 24 x 30-inch hot tin mill; product, merchant bar iron, sheet iron, and angle, tee, jail, and sash iron; also black plates for tinning for their own use; special products, shafting and charcoal bar, angle, and tee iron; annual capacity, 14,000 tons of bar iron and 6,000 tons of sheet iron. Fuel, coal. A corrugating plant is connected with the works. F. J. Droege, President; F. A. Droege, Vice-President; W. J. Droege, Secretary; J. C. Droege, Treasurer.—*See Tinplate and Terne Plate Works.*

Louisville Bolt and Iron Company, Incorporated, Louisville, Jefferson county. Built in 1900–1 and first put in operation on 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. Works for the manufacture of bolts and nuts are connected with the plant. 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. F. W. Bonnie, President and Treasurer; C. L. Robinson, Vice-President.

Mitchell-Tranter Works, Republic Iron and Steel Company, Chicago. Works at Covington, Kentucky.—*For description see page 86.*

Newport Rolling Mill Company, Newport, Campbell county. Built in 1857 and rebuilt throughout in 1891 and 1899; 8 single puddling and 8 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 two 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, 31,000 tons. Fuel,

coal. Brands, "Newport Best," "Globe," and "Newport Steel." Also manufactures galvanized sheets. J. A. Andrews, President; W. N. Andrews, Secretary; A. L. Andrews, Treasurer.

Norton Iron Works, Incorporated, Ashland, Boyd county. 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, 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; Joseph C. Butler, Vice-President; R. C. Richardson, Secretary; W. C. Richardson, Treasurer.

Watts Works, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Works at Middlesborough, Kentucky.—*For description see pages 176–77.*

Number of rolling mills and steel works in Kentucky: 10. Of these one makes Bessemer steel and one makes open-hearth steel.

TENNESSEE.

COKE FURNACES—19.

Bon Air Coal and Iron Company, Arcade Building, Nashville. Three stacks: Allens Creek Furnaces, Mannie, Wayne county; two stacks, Nos. 1 and 2, each 60 x 12, built in 1892–3, using machinery from two abandoned coke furnaces at West Nashville, Tennessee; since thoroughly overhauled and new stoves added; No. 1 blown in April 22, 1893, and No. 2 blown in soon afterwards; 6 Gordon hot-blast stoves; fuel, coke; ore, local brown hematite; product, high-phosphorus and high-silicon pig iron; 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. Warner Furnace, Warner, Hickman county; one stack, 55 x 11, first put in blast November 12, 1881; hot or cold blast; fuel, coke; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 30,000 tons; brand, "Warner." Total annual capacity of the three stacks, 102,000 tons. Building 200 bee-hive coke ovens at Eastland, Cumberland county, Tenn., which will probably be completed and in operation in July, 1904. John P. Williams, President; J. M. Overton, Vice-

President and General Manager; C. Cooper, Secretary; W. C. Dibrell, Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly owned and operated by the Buffalo Iron Company.)—*Allens Creek Furnaces active in 1903; Warner Furnace idle since 1893 and not likely to resume operations in the near future.*

Citico Furnace, Citico Furnace Company, Chattanooga, Hamilton county. 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; F. Nieland, Secretary and Treasurer. Selling agents, C. E. Louis, 618 Rookery Building, Chicago; C. L. Peirson & Co., Boston; Matthew Addy & Co., St. Louis; The Domhoff and Joyce Company, Cincinnati.—*Active in 1903.*

Dayton (The) Coal and Iron Company, Limited, Dayton, Rhea county. Sales office, First National Bank Building, Cincinnati, Ohio. Two stacks, one 75 x 17 and one 75 x 18, completed in 1885; one Foote and seven Whitwell stoves; fuel, coke; ores, Tennessee fossil and Georgia hematite; product, foundry 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. W. J. Isaacson, Managing Director, Cincinnati; M. H. Maury, General Superintendent, Dayton.—*Active in 1903.*

Embreeville Furnace, Embree Iron Company, 71 Broadway, New York. Furnace at Embreeville, Washington county, Tennessee. One stack, 80 x 18½, 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; product, malleable and high-grade foundry and forge pig iron; annual capacity, 50,000 tons. Brand, "Embreeville." C. P. Perin, President; J. L. Elliot, Vice-President; V. S. Paine, General Manager and Treasurer; J. F. Skelding, Superintendent. Selling agents, Pickands, Brown & Co., Chicago. (Formerly owned and operated by the Virginia Iron, Coal, and Coke Company.)—*Last active in 1900 but may resume operations in 1904.*

Helen Furnace, Red River Furnace Company, Clarksville, Montgomery county. One stack, 70 x 17, built in 1892 and first blown in December 8, 1895; three Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry, high-silicon, and Tennessee Scotch pig iron; annual capacity, 45,000 tons. Brands, "Red River" and "Helen." Graham Macfarlane, President; H. L. Williams, Vice-President; R. B. Hickman, Secretary; Mary A. Senter,

Treasurer; Henry T. De Bardeleben, Superintendent. Selling agents, Hickman, Williams & Co., St. Louis, Louisville, Chicago, and Cincinnati.—*Active in 1903.*

Johnson City Furnace, The Cranberry Furnace Company, lessee, Johnson City, Washington county. Philadelphia office, Drexel Building. One stack, 74¼ x 18, 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; product, low-phosphorus pig iron; annual capacity, 30,000 tons. Brand, "Cranberry." Calvin Pardee, President, H. M. Howe, Vice-President, and F. P. Howe, Secretary and Treasurer, Philadelphia. Selling agents, Crocker Brothers, New York. (Owned by the Virginia Iron, Coal, and Coke Company.)—*Active in 1903.*

LaFollette Furnace, LaFollette Coal, Iron, and Railway Company, LaFollette, Campbell county. New York office, 1405–6 Lord's Court Building, 27 William st. One stack, 95 x 20, built in 1901–2 and first put in blast September 24, 1902; four modified Kennedy stoves, each 90 x 18; fuel, coke; ores, red fossiliferous and brown hematite; product, foundry pig iron; annual capacity, 100,000 tons. Brand, "LaFollette Foundry." Connected with the furnace are 342 coke ovens with an annual capacity of 245,000 net tons. A machine shop is also connected with the furnace. John E. Searles, President, and George W. Oakley, Secretary and Treasurer, 1405–6 Lord's Court Building, New York; H. M. LaFollette, Vice-President and General Manager, and E. T. Warner, Assistant Secretary and Assistant Treasurer, LaFollette, Tenn. Selling agent, Field Evans Iron Company, Cincinnati. (Formerly called Searles Furnace.)—*Active in 1903.*

Napier Iron Works, Nashville, Davidson county. Furnace at Napier, Lewis county. 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, 18,000 tons. Brand, "Napier." W. R. Cole, President and General Manager, J. H. Fall, Vice-President, and Ira P. Jones, Jr., Secretary and Treasurer, Nashville. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

New Chattanooga Furnace, New Chattanooga Furnace Company, J. T. Hill, Trustee in Bankruptcy, First National Bank Building, Chattanooga, Hamilton county. One stack, 60 x 14, completed in 1874 and blown in in September, 1874; rebuilt in 1885, 1899,

and 1901; three Whitwell stoves, each 60 x 18; fuel, Virginia and Tennessee coke; ores, hard and soft red hematite; specialty, foundry pig iron; annual capacity, 30,000 tons. Brand, "Chattanooga." B. F. Miller, President and Treasurer; C. A. Stevenson, Vice-President; W. P. Neblett, Secretary; John D. Evans, Assistant Secretary. Selling agents, The Domhoff and Joyce Company, Cincinnati; J. K. Dimmick & Co., Philadelphia; Fieser & Bentley, Columbus, Ohio; C. A. Stevenson, St. Louis, Mo. (Formerly called the Chattanooga Furnace and operated by the Chattanooga Furnace Company.)—*Active in 1903.*

Rockdale Furnace, Rockdale Iron Company, Rockdale, Maury county. 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, Virginia; ore, brown from Pinkney, Tennessee; product, foundry and basic pig iron; annual capacity, 18,000 tons. J. J. Gray, Jr., Proprietor. (Formerly called King Furnace.)—*Active in 1903.*

Rockwood Furnaces, Roane Iron Company, Rockwood, Roane county. Sales office, Chattanooga. Two stacks: No. 1, (formerly No. 3,) 80 x 17, built in 1893 and blown in January 6, 1894; rebuilt in 1901; four Hugh Kennedy hot-blast stoves. No. 2, (formerly No. 4,) 80 x 17, partly erected in 1893 and completed and blown in in July, 1901; four Hugh Kennedy hot-blast stoves. Fuel, coke; ore, red fossiliferous; product, foundry and open and close silver gray pig iron; total annual capacity, 100,000 tons. Brand, "Rockwood." Connected with the furnaces are 372 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, C. M. McGhee, Vice-President, Orion L. Hurlbut, Secretary, and F. Nieland, Treasurer, Chattanooga; Willard Warner, Jr., Superintendent of Furnaces, Rockwood. Selling agents for New England and Eastern New York, C. L. Peirson & Co., Boston; for St. Louis territory, Matthew Addy & Co., St. Louis; for Ohio and Indiana, The Domhoff and Joyce Company, Cincinnati, Ohio. (Old Nos. 1 and 2 dismantled.)—*Active in 1903.*

South Pittsburg Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham, Alabama. Furnaces at South Pittsburg, Tennessee. Two stacks; fuel, coke.—*For description see pages 181–82.*

Standard Furnace, Standard Iron Company, Goodrich, Hickman county. 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 forge pig iron; annual capacity, 24,000 tons. Brand, "Standard." J. H. Ambrose, President; W. L. Granbery, Secretary; J. J. Gray, Jr., General Manager. Selling agents, Rogers, Brown & Co., New York and branch houses; Hickman, Williams & Co., Louisville and Chicago.—*Active in 1903.*

Warner Furnace, Warner Iron Company, Nashville. Furnace at Cumberland Furnace P. O., Dickson county. One stack, 60 x 12½, built on the site of the old furnace in 1892–3 and blown in March 25, 1893; two Gordon improved stoves; fuel, Virginia coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 30,000 tons. Brand, "Warner." Joseph Warner, President; John T. Banks, Secretary; Edwin Warner, Treasurer; W. B. Willman, Superintendent. Selling agents, Rogers, Brown & Co., New York and branch houses; Hickman, Williams & Co., Chicago.—*Active in 1903.*

Number of coke furnaces in Tennessee: 19 stacks.

CHARCOAL FURNACES—3.

Aetna Furnace, First National Bank, owners, Nashville. Furnace at Aetna, Hickman county. 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 Buffalo Iron Company; later by the Bon Air Coal and Iron Company.)—*Idle and for sale.*

Dover Iron Company, Bear Spring, Stewart county. Two stacks in Stewart county, both leased. Bear Spring Furnace, located on the line of the Tennessee and Cumberland River Railroad, connecting with the Louisville and Nashville Railroad; telegraph address, Tennessee Ridge; one stack, 47 x 9½, built in 1832, abandoned in 1854, rebuilt in 1873, and again abandoned; repaired in 1893–4 and blown in in February, 1894. Dover Furnace, at Carlisle, near Bear Spring; one stack, built in 1828, abandoned in 1834, rebuilt in 1854 and 1873, again abandoned about 1880, and again rebuilt in 1902–3; blown in February 3, 1903; partly destroyed by fire in August, 1903; rebuilt in 1903–4; present size, 36½ x 9. 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, 8,600 tons. Brand, "Dover." Charcoal pits and kilns connected with the furnaces have an annual capacity of 1,200,000 bushels. Graham Macfarlane, President and General Manager, and J. C. Ralls, Assistant Manager, Bear Spring, Tenn.; R. B. Hickman, Secretary,

Louisville, Ky.; H. L. Williams, Treasurer, Rookery Building, Chicago. Selling agents, J. H. Hillman & Son, Pittsburgh. (Owned by the Cumberland River Estates, Limited.)—*Active in 1903.*

Number of charcoal furnaces in Tennessee: 3 stacks.

Total number of furnaces in Tennessee: 22 stacks. Of these 19 use coke and 3 use charcoal. No mixed charcoal and coke furnaces.

ROLLING MILLS AND STEEL WORKS—2.

Knoxville Iron Company, Knoxville, Knox county. 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. William P. Chamberlain, President; T. I. Stephenson, Vice-President, General Manager, and Selling Agent; Otis A. Brown, Secretary and Treasurer. (Harriman Works, at Harriman, Tenn., and Knoxville Works, at Knoxville, Tenn., dismantled in 1902–3.)

Southern (The) Steel Works, 610–14 Boyce st., Chattanooga, Hamilton county. Removed from Kingston in 1877; remodeled and enlarged in 1883; one heating furnace, one 8-pot crucible steel-melting furnace with an annual capacity, single turn, of 300 tons, one 3-gross-ton acid open-hearth steel furnace with an annual capacity of 500 tons, and one 2,000-lb. hammer; product, tool steel, forgings, and steel castings. Fuel, coal and coke.

Number of rolling mills and steel works in Tennessee: 2. Of these one makes crucible and open-hearth steel.

NORTH CAROLINA.

COKE FURNACES—1.

Cherokee Furnace, Empire Steel and Iron Company, Catasauqua, Pa. Furnace at Greensboro, North Carolina. One stack; fuel, coke.—*For description see page 111.*

Number of furnaces in North Carolina: one coke stack. No charcoal stacks. There are no rolling mills or steel works in North Carolina.

GEORGIA.

COKE FURNACES—1.

Rising Fawn Furnace, The Georgia Iron and Coal Company, Atlanta. Furnace at Rising Fawn, Dade county. One stack, 75 x

19, built in 1873–5 and put in blast June 18, 1875; rebuilt in 1902–3; four Whitwell stoves, each 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." Connected with the furnace are 330 coke ovens. Joel Hurt, President; J. E. Fraser, Secretary and Treasurer; George F. Hurt, General Manager.—*Active in 1903.*

Number of coke furnaces in Georgia: one stack.

CHARCOAL FURNACES—3.

Cherokee Iron Works, Alabama and Georgia Iron Company, 71 Broadway, New York. Furnace at Cedartown, Polk county, Georgia. 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 near the works; product, high-grade car-wheel pig iron; annual capacity, 18,000 tons. Brand, "Cherokee." Noah H. Swayne, 2d, President, and M. O. Guiss, Secretary and Treasurer, Cedartown, Georgia; F. M. Davis, Vice-President, and Phillips Isham, Assistant Secretary, 71 Broadway, New York. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Rome Furnace, The Rome Furnace Company, Rome, Floyd county. General office, Chattanooga, Tenn. One stack, 65 x 12, built in 1890–1 and blown in in May, 1891; three Whitwell stoves; ores, red and brown hematite from Floyd, Polk, and Chattooga counties; product, high-grade car-wheel pig iron; annual capacity, 20,000 tons. Brand, "Rome." Connected with the furnace are charcoal pits and kilns with an annual capacity of 2,000,000 bushels. L. S. Colyar, President and Treasurer; J. P. Hoskins, Vice-President; D. G. Crabtree, Secretary. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Tallapoosa Furnace, Southern Car Wheel Iron Company, Tallapoosa, Haralson county. One stack, 60 x 11, built in 1888–9 and blown in in May, 1890; idle for a number of years; revived in 1900; one Player iron stove; closed top; cold and warm blast; ore, brown hematite; product, pig iron for car wheels, chilled rolls, and malleable castings; annual capacity, 13,500 tons. Brand, "Blue Ridge." Stephen N. Noble, President and Manager, Tallapoosa; W. M. Kelley, Vice-President, and Ralph H. Brown, Secretary and Treasurer, Atlanta. (Formerly owned by the Georgia Vineyard Company.)—*Active in 1903.*

Number of charcoal furnaces in Georgia: 3 stacks.

Total number of furnaces in Georgia: one coke and 3 charcoal stacks.

ROLLING MILLS—1.

Atlanta Steel Hoop Company, Equitable Building, Atlanta, Fulton county. Built in 1901 and first put in operation in June, 1901; one coal and 2 gas heating furnaces and 2 trains of rolls (one 8 and one 18-inch); product, hoops, cotton-ties, bands, light rails, etc.; annual capacity, 20,000 tons. Fuel, bituminous coal and producer gas. A small machine shop is connected with the works. S. T. Weyman, President; G. W. Connors, Secretary and Treasurer; P. H. Mynahan, Superintendent.

Number of rolling mills in Georgia: one.

ALABAMA.

COKE FURNACES—43 COMPLETED, 2 BUILDING, AND 3 PROJECTED.

Alabama Steel and Wire Company, Birmingham. Furnace at Gadsden, Etowah county. One stack, 90 x 20, built in 1902-3 and first blown in January 17, 1904; four 2-pass stoves; fuel, coke; ore, red from Cherokee county, Alabama; product, basic and foundry pig iron; annual capacity, 110,000 tons. Brand, "Schuler." Three additional furnaces of the same size are projected. One Heyl & Patterson pig-iron casting machine is connected with the furnace; also 200 coke ovens with an annual capacity of 146,000 net tons; also a gray iron foundry and a machine shop.—*First blown in January 17, 1904. See Rolling Mills and Steel Works, page 303.*

Alice Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Two stacks; fuel, coke.—*See pages 180–81.*

Bessemer Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Bessemer. Five stacks; fuel, coke.—*For description see page 181.*

Central Iron and Coal Company, 116 Nassau st., New York City. Furnace at Tuscaloosa, Tuscaloosa county, Alabama. One stack, 85 x 18, built in 1901-3 and first blown in August 4, 1903; four Foote stoves, each 17 x 85 feet; fuel, coke; ores, local red and brown; 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 ovens. Joseph Lodge, President, George F. Ross, First Vice-President, Alfred Fowle, Jr., Second Vice-President, and Winthrop L. Rogers, Secretary and Treasurer, New York; R. E. Lee, Superintendent, Tuscaloosa. —*Active in 1903.*

Clifton Furnaces, Alabama Consolidated Coal and Iron Company, Birmingham. Furnaces at Ironaton. Two stacks; fuel, coke.—*For description see page 186.*

Ella Furnace, Lacey-Buek Iron Company, Birmingham. Furnace at Trussville, Jefferson county. One stack, 80 x 17½, built in 1887–9 and blown in in April, 1889; rebuilt in 1901 and 1903; 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 at Crudup, Alabama, and brown ore from the company's mines in Georgia; product, foundry pig iron; annual capacity, 70,000 tons. Brand, "Trussville." Connected with the furnace are 300 coke ovens with an annual capacity of 125,000 net tons. C. E. Buek, President; J. D. Lacey, Vice-President; F. V. Berry, Secretary. Selling agents, Hickman, Williams & Co., Chicago and Louisville; Walter Wallingford & Co., Cincinnati; Dalton, Nash & Co., New York; DeCamp Brothers and Yule Iron, Coal, and Coke Company, St. Louis. (Formerly operated by C. E. Buek & Co.)—*Active in 1903.*

Ensley Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Ensley. Five completed stacks and one stack building; fuel, coke.—*For description see page 181.*

Gadsden-Alabama Furnaces, Alabama Consolidated Coal and Iron Company, Birmingham. Furnaces at Gadsden. Two stacks; fuel, coke.—*For description see page 186.*

Hattie Ensley Furnace, Sloss-Sheffield Steel and Iron Company, Birmingham. Furnace at Sheffield. One stack; fuel, coke.—*For description see page 184.*

Jenifer Furnace Company, J. W. McQueen, Trustee, Birmingham. Furnace at Jenifer, Talladega county. 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 from the company's mines; product, foundry and gray forge pig iron; annual capacity, 50,000 tons. Brand, "Jenifer." Connected with the furnace are 200 coke ovens with an annual capacity of 50,000 net tons. W. H. Weller, President and Treasurer, Anniston, Ala.; W. Aubrey Thomas, Vice-President and General Manager, Niles, Ohio; Edward F. Niedecken, Secretary, Milwaukee, Wisconsin.—*Active in 1903.*

Lady Ensley Furnace, operated by the North Alabama Furnace Company, Sheffield. One stack; fuel, coke. Controlled by the Sloss-Sheffield Steel and Iron Company, Birmingham.—*For description see page 184.*

Lookout Mountain Iron Company, Battelle, DeKalb county. One stack, 85 x 19, built in 1903–4 and not put in blast down to June 10, 1904; four 4-pass Whitwell stoves, each 20 x 80; fuel, coke made in ovens owned by the company; ore, red hema-

tite obtained from the company's mines which are located about one-half of a mile from the furnace; product, foundry pig iron; annual capacity, 100,000 tons. Brand, "Battelle." Connected with the furnace are 150 coke ovens with an annual capacity of 75,000 net tons; 150 additional ovens are to be erected. J. G. Battelle, President; Erskine Ramsay, Vice-President; J. F. Stiens, Secretary and Treasurer; C. E. Bowron, General Superintendent; John Dowling, Furnace Superintendent.—*To be blown in about July 1, 1904.*

Oxmoor Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham. Furnaces at Oxmoor. Two stacks; fuel, coke.—*For description see page 181.*

Philadelphia Furnace, Sloss-Sheffield Steel and Iron Company, Birmingham. Furnace at Florence. One stack; fuel, coke.—*For description see pages 184–85.*

Pioneer Furnaces, operated by the Pioneer Mining and Manufacturing Company, Thomas. Office, Birmingham. Three stacks; fuel, coke. Controlled by the Republic Iron and Steel Company, Chicago.—*For description see pages 83–4.*

Sheffield Furnaces, Sheffield Coal and Iron Company, 907 Maritime Building, No. 8 Bridge st., New York. Furnaces at Sheffield, Colbert county, Alabama. 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; twelve Whitwell-Cowper stoves; fuel, Stonega coke from Virginia; ores, Alabama and Tennessee brown hematite obtained from the company's mines; product, foundry pig iron; total annual capacity, 210,000 tons. Brand, "Sheffield." William Edenborn, President and Treasurer, W. R. Walker, Vice-President, Otto Mann, Assistant Treasurer, and J. E. Cole, Secretary, New York; O. O. Laudig, Superintendent of Furnaces, Sheffield, Alabama. Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly operated by the Tennessee Coal, Iron, and Railroad Company.)—*Active in 1903.*

Sloss Furnaces, Sloss-Sheffield Steel and Iron Company, Birmingham. Four stacks at Birmingham; fuel, coke.—*See page 185.*

Talladega Furnace, Northern Alabama Coal, Iron, and Railway Company, 25 Broad st., New York. Furnace at Talladega, Talladega county, Alabama. 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, 40,000 tons. May be enlarged in 1904. Connected with

the furnace are 182 coke ovens. S. H. March, President; F. A. Vogel, Vice-President; Cyrus Williams, Secretary and Treasurer; George Dunglinson, Assistant Secretary and Assistant Treasurer; John C. Soley, General Manager. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Vanderbilt Furnace, Tutwiler Coal, Coke, and Iron Company, Birmingham, Jefferson county. Furnace at Boyles, Jefferson county. One stack, 75 x 15¾; commenced building February 9, 1890; blown in August 23, 1890; remodeled in 1897 and rebuilt in 1899 and 1901; four Massicks & Crooke stoves; fuel, Alabama coke; ores, brown and red hematite; product, soft foundry and gray forge pig iron; annual capacity, 54,000 tons. Brand, "Vanderbilt." Coke ovens with an annual capacity of 105,000 net tons are connected with the furnace. E. M. Tutwiler, President; E. L. Adler, General Manager. Selling agents, The Domhoff and Joyce Company, Cincinnati; DeCamp Brothers and Yule Iron, Coal, and Coke Company, St. Louis; C. E. Louis, Rookery Building, Chicago; C. L. Peirson & Co., Boston; Crocker Brothers, New York and Philadelphia.—*Active in 1903.*

Williamson Furnace, Williamson Iron Company, Birmingham, Jefferson county. One stack, 65 x 14¾, 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, 20,000 tons. Brand, "Williamson." An iron foundry with an annual capacity of 2,000 tons is connected with the furnace; also a machine shop. F. D. Dimmick, President; L. C. Bradley, Vice-President; R. K. Edwards, Superintendent.—*Active in 1903.*

Woodstock Furnaces, The Woodstock Iron Works, Anniston, Calhoun county. Two stacks: No. 3, 82 x 20, built in 1887–9, blown in October 10, 1889, and rebuilt in 1901–2; 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, 150,000 tons. Brand, "Woodstock, (W. I. W.)" Connected with the furnaces are 374 coke ovens with an annual capacity of 155,000 net tons. S. M. Lehman, President, 22 William st., P. J. Goodhart, Treasurer, 57 Broadway, and Norbert Heinsheimer, Secretary, 39 Wall street, New York; John B. Knox, Vice-President, Paul J. Murphy, Manager, and C. T. Williams, Superintendent, Anniston, Alabama. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Woodward Iron Company, Woodward, Jefferson county. Two com-

pleted stacks and one stack building. Completed stacks, Nos. 1 and 2, each 75 x 17, one built in 1882–3 and put in blast in August, 1883, and the other built in 1886 and put in blast in January, 1887; ten Whitwell stoves; fuel, coke made from the company's coal; ore, red fossiliferous mined within 3 miles of the furnace; specialty, foundry pig iron; total annual capacity, 125,000 tons. Building furnace, to be known as No. 3, will be 85 x 20 feet and will be equipped with four Whitwell stoves, each 20 x 80; it will produce foundry and forge pig iron. Brand, "Woodward." J. H. Woodward, President; R. H. Banister, Secretary; Silas Hine, Treasurer; A. H. Woodward, General Superintendent.—*Active in 1903.*

Number of coke furnaces in Alabama: 43 completed stacks, 2 stacks building, and 3 stacks projected.

CHARCOAL FURNACES—6.

Attalla Furnace, Eagle Iron Company, Chattanooga, Tennessee. Furnace at Attalla, Etowah county, Alabama. 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." L. S. Colyar, President and Treasurer; D. G. Crabtree, Secretary and Assistant Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Coosa Furnace, Southern Car and Foundry Company, Birmingham. Furnace at Gadsden, Etowah county. One stack; fuel, charcoal.—*For description see page 187.*

Rock Run Furnace, The Bass Foundry and Machine Company, Rock Run, Cherokee county. One stack, 54½ x 11½, built in 1873–4, enlarged in 1881 and 1892, and rebuilt in 1894; warm blast; ore, local brown hematite; product, pig iron for car wheels and strong castings; annual capacity, 15,000 tons. Brand, "Rock Run." J. H. Bass, President, C. T. Strawbridge, Secretary, F. S. Lightfoot, 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 1903.*

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; product, low-phosphorus and high-grade car-wheel pig iron; annual capacity, 6,500 tons. Brand, "Round Mountain." Connected with the furnace are charcoal

pits and kilns; company expects to make wood alcohol and acetate of lime in the fall of 1904. W. J. M. Gordon, President; H. Strautmann, Treasurer; E. V. Shackleford, Secretary and General Manager. Selling agents, Rogers, Brown & Co., New York and branch houses. (Formerly owned by the Round Mountain Coal and Iron Company.)—*Active in 1903.*

Shelby Furnaces, Shelby Iron Company, Shelby, Shelby county. Two stacks: Nos. 1 and 2, each 60 x 14, built in 1863 and 1873; No. 1 rebuilt in 1889; warm blast; ore, brown hematite obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 40,000 tons. Brand, "Shelby." The company makes about 1,000,000 bushels of charcoal annually. T. G. Bush, President, Birmingham; B. Y. Frost, Secretary and Treasurer, 80 Broadway, New York; A. H. Avery, Assistant Treasurer, Shelby. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & Co., Boston and New York.—*Active in 1903.*

Number of charcoal furnaces in Alabama: 6 stacks.

Total number of furnaces in Alabama: 49 completed, 2 building, and 3 projected. Of these 43 use coke, 2 coke stacks are being built, 3 coke stacks are projected, and 6 stacks use charcoal.

ROLLING MILLS AND STEEL WORKS—13 COMPLETED AND 1 BUILDING.

Alabama Steel and Wire Company, Birmingham. Two works, one at Ensley, Jefferson county, and one at Gadsden, Etowah county. Ensley Works, 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. Gadsden Works, built in 1903–4 and first put in operation in June, 1904; four 50-gross-ton basic open-hearth steel furnaces and one 36-inch blooming mill; product, blooms and billets; annual capacity, 120,000 tons of ingots and 300,000 tons of blooms and billets; fuel, coal. E. T. Schuler, President, G. H. Schuler, Treasurer, and R. D. Carver, Secretary, Birmingham.—*See Blast Furnaces, page 298.*

Alabama Tube and Iron Company, Birmingham Trust and Savings Company, Trustee, Birmingham. Works at Helena, Shelby county. Started in March, 1873; enlarged in 1889; acquired in 1901 by the present company; one double and 11 single puddling fur-

naces, 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 ¼ of an inch to 2 inches; annual capacity, 15,000 tons. Fuel, bituminous coal and producer gas. A galvanizing plant and a machine shop are also connected with the works.—*Plant idle; company may be reorganized.*

Alabama Works, Republic Iron and Steel Company, Chicago. Works at Gate City, Alabama.—*For description see page 84.*

Anniston Works, The Illinois Car and Equipment Company, Rookery Building, Chicago. Works at Anniston, Calhoun county, Alabama. Built in 1884 and enlarged in 1888–9 and 1893; 12 single and 6 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 cast-iron car and locomotive wheels, bolts, rivets, lag screws, and light and heavy iron and steel forgings are connected with the works; also a plant for building wooden freight cars. Alfred E. McCordic, President and Treasurer; Charles Y. Freeman, Secretary. (Formerly operated under lease by the Southern Car and Foundry Company.)—*For sale or lease.*

Bessemer Rolling Mills, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Bessemer, Jefferson county.—*For description see page 182.*

Birmingham Rolling Mills, operated by the Birmingham Rolling Mill Company, Birmingham. Controlled by the Republic Iron and Steel Company, Chicago.—*For description see pages 84–5.*

Birmingham Steel and Iron Company, Birmingham. Commenced building one 10-gross-ton basic open-hearth steel furnace in the spring of 1904; will probably be completed in September, 1904; product, to be general machinery castings; estimated annual capacity, 6,000 tons. Fuel, producer gas. This company succeeds the Hood Machine Company and now makes car wheels, car axles, forgings, etc.; it also does general foundry and machine work. J. R. McWane, President and Treasurer; W. T. Adams, Vice-President; T. W. Roberts, Secretary.

Eclipse Rolling Mill and Manufacturing Company, East Birmingham, Jefferson county. 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. H. Graham, President; E. F. Rowley, Vice-President; John J. Wirth, Secretary and Treasurer; Thomas J. Rowley, General Manager.

Jefferson Steel Works, Union Iron and Steel Company, New York. Works at Birmingham, Jefferson county, Alabama.—*For description see page 106.*

Sheffield Rolling Mill, Sheffield Rolling Mill Company, Sheffield, Colbert county. 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. May add two 25-gross-ton basic open-hearth steel furnaces. Robert C. Johnston, President; Thomas F. Johnston, Secretary and Treasurer.

Steel Casting Department, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley, Jefferson county.—*For description see page 182.*

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley, Jefferson county.—*For description see pages 182–83.*

Weller Rolling Mill and Forge Company, Anniston, Calhoun county. Built in 1890–1; 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 machines; product, merchant iron and steel, light T rails, special shapes, and all sizes of railroad spikes; annual capacity, 12,000 tons of rolled material. Fuel, bituminous coal. W. H. Weller, President; John T. Weller, Vice-President; J. H. Harden, Secretary and Treasurer. (Formerly called the Anniston Rolling Mills and operated by the Anniston Rolling Mill Company.)

Number of rolling mills and steel works in Alabama: 13 completed and one building. Of these one has a Bessemer converter, 5 have open-hearth steel plants, one open-hearth steel plant is being built, and one open-hearth steel plant is projected.

TEXAS.

CHARCOAL FURNACES—4.

Jefferson Furnace, Jefferson Iron Company; main office, Chattanooga, Tennessee. Furnace at Jefferson, Marion county, Texas. One stack, 60 x 12, built in 1889–91 and blown in March 15, 1891; two Durham iron stoves; hot blast; ore, brown hematite; product, car-wheel pig iron; annual capacity, 18,000 tons. Brand, "Jefferson." Charcoal pits and kilns are connected with the furnace. L. S. Colyar, President and Treasurer, Chattanooga, Tennessee; W. B. Ward, Vice-President, and W. T. Atkins, Secretary, Jefferson, Texas. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Sam Lanham Furnace, State of Texas, owner, Rusk, Cherokee county. Original stack, known as "Old Alcalde," built in 1883 and put in blast February 27, 1884; rebuilt in 1896; old furnace torn down in 1903 and an entirely new stack erected on its site in the same year; present size of furnace, 65 x 12½; rebuilt stack blown in April 6, 1904; three hot-blast stoves, each 60 x 16; ore, brown hematite mined near the furnace; product, car-wheel, foundry, and basic pig iron; annual capacity, 23,000 tons. Brand, "Old Alcalde," "Sam Lanham," and "Texas Car Wheel." A plant for the manufacture of cast-iron gas and water pipe is connected with the furnace; also a gray iron foundry for the manufacture of engine castings, tombstones, grates, mantles, etc. Robert Miller, Superintendent of furnace. Selling agents, Hickman, Williams & Co., St. Louis and Chicago.—*Active in 1903.*

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 November 26, 1891; iron stoves; hot blast; ores, brown hematite and black laminated; product, car-wheel and foundry pig iron; annual capacity, 18,000 tons. Brand, "Star and Crescent."—*Last active in 1899.*

Tassie Belle Furnace, New Birmingham, Cherokee county. 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, 13,500 tons. Brand, "Tassie Belle." R. L. Coleman, Agent, New Birmingham, Texas. (Owned by James A. Mahony, New York.)—*Idle and for sale or lease.*

Number of furnaces in Texas: 4 charcoal stacks, of which 2 were active in 1903. No coke stacks.

There are no active rolling mills or steel works in Texas.

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—15 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Anna Furnace, The Struthers Furnace Company, Citizens Building, Cleveland. Furnace at Struthers, Mahoning county. 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, malleable, and Bessemer pig iron cast in chills; annual capacity, 100,000 tons. Equipped with one Uehling pig-iron casting machine. A plant for the manufacture of Portland cement from blast furnace slag is connected with the works; daily capacity, 500 barrels; brand, "Struthers Portland." W. C. Runyon, President; J. B. Stubbs, Vice-President; A. Grossman, Treasurer; George L. Fairbank, Secretary; S. A. Richards, Manager.—*Active in 1903.*

Cherry Valley Furnace, The Cherry Valley Iron Company, Peoples Savings Bank Building, Pittsburgh. Furnace at Leetonia, Columbiana county, Ohio. One stack, 75 x 17, built in 1868; rebuilt in 1883; three Massicks & Crooke stoves, 85 x 21, built in 1903; fuel, coke; ore, Lake Superior; product, "American-Scotch" foundry pig iron; annual capacity, 80,000 tons. Brands, "Cherry Valley," "Leetonia," and "Fort Pitt." One coke stack, 80 x 18½, is projected; estimated annual capacity, 110,000 tons of foundry and car-wheel pig iron. The projected stack will utilize all the equipment and will take the place of the present furnace, which will be dismantled when the new stack is completed; ground for the foundations for the new stack will probably be broken in July, 1904. E. M. Peters, Superintendent. Sole selling agents, Joshua W. Rhodes & Co., Pittsburgh. The company operates 180 coke ovens at Leetonia with an annual capacity of 120,000 net tons.—*Active in 1903.* *See Fannie Furnace, page 258.*

Grace Furnace No. 2, The Brier Hill Iron and Coal Company, Youngstown, Mahoning county. 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; Henry Tod, Vice-President; J. G. Butler, Jr., General Manager; H. H. Stambaugh, Secretary and Treasurer.—*Active in 1903.*

Hannah Furnace, Republic Iron and Steel Company, Chicago. Furnace at Youngstown, Ohio. One stack; fuel, coke.—*For description see page 83.*

Haselton Furnace, Republic Iron and Steel Company, Chicago. Furnace at Haselton, a suburb of Youngstown, Ohio. One stack; fuel, coke.—*For description see page 83.*

Hubbard Furnaces, The Andrews and Hitchcock Iron Company, Youngstown. Works at Hubbard, Trumbull county. 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; No. 1 has four Cowper-Kennedy stoves and No. 2 has three Cowper-Kennedy stoves; fuel, Connellsville coke; product, Bessemer, gray forge, malleable Bessemer, and foundry pig iron. Brands, "Hubbard," "Hubbard Scotch" soft foundry, and "Climax" strong foundry made from Lake Superior ores; total annual capacity, 220,000 tons. Frank Hitchcock, President; W. J. Hitchcock, Vice-President; H. W. Heedy, Secretary and Treasurer. Selling agents, C. L. Peirson & Co., 44 Kilby st., Boston, Mass.; The Bourne-Fuller Company, Cleveland, Ohio.—*Active in 1903.*

McKeefrey Furnace, The Salem Iron Company, Pittsburgh. Furnace at Leetonia, Columbiana county, 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, 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; S. R. Fellows, Superintendent. Selling agents, McKeefrey & Co., Leetonia and Pittsburgh. (Formerly called Seneca Furnace.)—*Active in 1903.*

Mary Furnace, The Ohio Iron and Steel Company, Lowellville, Mahoning county. 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; also basic pig iron cast in chills and pig iron of special grades and analyses; annual capacity, 135,000 tons. Brands, "The Mary" for lake ore iron and "The Mary Ohio Scotch." May add one Heyl & Patterson or Uehling pig-iron casting machine in 1904. Thomas H. Wells, President; John C. Wick, Vice-President; F. H. Wick, Treasurer; Robert Bentley, Secretary and General Manager. 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 1903.*

Mattie Furnace, Girard Iron Company, Girard, Trumbull county. 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, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 100,000 tons. Brand, "Girard." S. K. Hine, Manager. Selling agents, A. M. Byers Company, Pittsburgh.—*Active in 1901. This furnace is owned by the A. M. Byers Company, which operates a rolling mill at Pittsburgh. See page 248.*

Niles Furnace, Carnegie Steel Company, Pittsburgh. Furnace at Niles, Ohio. One stack; fuel, coke.—*For description see page 8.*

Ohio Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Youngstown, Ohio. Three completed stacks and one stack building; fuel, coke.—*For description see pages 8–9.*

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, basic, and foundry pig iron; annual capacity, 90,000 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. Tod Ford, President; Paul Jones, Vice-President; John Stambaugh, Secretary and Treasurer; E. L. Ford, General Manager.—*Active in 1903.*

Number of coke furnaces in the Mahoning Valley, including furnaces in a part of Columbiana county: 15 completed stacks, one stack building, and one stack projected. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—18.

Andrews Works, Republic Iron and Steel Company, Chicago. Works at Youngstown, Ohio.—*For description see page 84.*

Bessemer Plant, Republic Iron and Steel Company, Chicago. Works at Youngstown, Ohio.—*For description see page 85.*

Brown Bonnell Works, Republic Iron and Steel Company, Chicago. Works at Youngstown, Ohio.—*For description see page 85.*

Empire Iron and Steel Company, Niles, Trumbull county. Built in 1902 and first put in operation in October, 1902; one bar furnace, 8 sheet and pair furnaces, 4 annealing furnaces, 6 sheet mills, (2 roughing and 4 finishing,) and 2 cold mills; product, sheet steel specialties, sheets from No. 10 to No. 30 gauge, shovel

steel, and cutlery steel; annual capacity, 15,000 tons. Brand, "Empire." Fuel, coal. A galvanizing plant is connected with the works. Wade A. Taylor, President, Treasurer, and Selling Agent; Charles S. Thomas, Vice-President and Manager; John F. O'Dea, Secretary.

Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio. Product, black plates for tinning. —*For description see page 55.*

Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio. Product, muck bar and sheet iron and sheet steel.—*For description see page 56.*

Girard Mill, Carnegie Steel Company, Pittsburgh. Works at Girard, Ohio.—*For description see pages 11–12.*

Lower Union Mill, Carnegie Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*For description see page 13.*

Mahoning Valley Works, Republic Iron and Steel Company, Chicago. Works at Youngstown, Ohio.—*For description see page 86.*

Niles (The) Iron and Sheet Company, Niles, Trumbull county. Built in 1901 and first put in operation in May, 1901; 4 sheet and 4 pair furnaces, 2 double annealing furnaces, one bar mill, 4 hot sheet mills, and 2 cold mills; product, black sheet steel; annual capacity, 12,000 tons. Fuel, coal. James S. Paterson, President and Manager; H. M. Robinson, Vice-President; W. A. Thomas, Secretary and Treasurer.

Ohio Steel Works, Carnegie Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*For description see page 14.*

Struthers Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Struthers, Ohio.—*For description see page 60.*

Upper Union Mill, Carnegie Steel Company, Pittsburgh. Works at Youngstown, Ohio.—*For description see page 15.*

Warren Mill, Carnegie Steel Company, Pittsburgh. Works at Warren, Ohio.—*For description see pages 15–16.*

Youngstown (The) Bolt Company, (successor to the Youngstown Manufacturing Company,) Youngstown. Works at Struthers, Mahoning county. Rolling mill added to a bolt and nut plant in 1902–3 by the Youngstown Manufacturing Company; first rolled materials made in April, 1903; 2 Lauth heating furnaces and one 10-inch train of rolls; product, iron and steel bars and shapes, largely consumed by the company in the manufacture of machine, carriage, and track bolts, boiler and structural rivets, nuts, etc.; annual capacity, 24,000 tons of rolled material. Fuel, bituminous coal.—*Permanent officers of the company had not been elected down to June 1, 1904.*

Youngstown (The) Iron and Steel Roofing Company, Youngstown.

Built in 1901 and first put in operation September 4, 1901; 2 double puddling furnaces, 2 scrap furnaces, 4 heating furnaces, 6 annealing furnaces, one 3-high 24-inch bar mill, and 8 sheet mills, (six 26-inch hot and two 24-inch cold,) and two sets of 24 x 44-inch cold mills for the manufacture of range steel, bow socket steel, heavy gauges of expanded metal for fire proofing, etc.; product, sheet iron and sheet steel; annual capacity, 20,000 tons. Fuel, coal. Contemplates erecting an open-hearth steel plant. A galvanizing plant containing 2 pots is connected with the works. L. E. Cochran, President; G. M. McKelvey, Vice-President; C. A. Cochran, Secretary; Mason Evans, Treasurer; John O. Pew, General Manager.

Youngstown (The) Steel Casting 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. E. B. Lawrence, President; T. B. Van Alstine, Vice-President; William R. Palmer, Secretary and General Manager; G. E. Rose, Treasurer; S. S. Baker, Assistant Treasurer.

Youngstown Works, The Youngstown Iron Sheet and Tube Company, Youngstown. Built in 1901–2; puddle and sheet mills first put in operation in February, 1902, and skelp mills in December, 1902; 14 double puddling furnaces, 6 heating furnaces, 4 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,) and 3 cold mills (two 24 x 44 and one 24 x 52-inch); product, muck bars, skelp, sheet bars, and black and galvanized sheets; annual capacity. 24,000 tons of muck bars, 72,000 tons of sheet bars and skelp, and 22,000 tons of black sheets. Fuel, bituminous coal. A plant for the manufacture of black and galvanized wrought iron and steel pipe is connected with the works; first pipe made in July, 1902; sizes, from ⅜ of an inch to 8 inches; annual capacity, 60,000 tons of black and 20,000 tons of galvanized pipe. A plant for the manufacture of galvanized sheets is also connected with the works; annual capacity, 20,000 tons. Also a gray iron foundry for the manufacture of mill castings for the company's use; annual capacity, 500 tons. J. A. Campbell, Vice-President and General Manager; George E. Day, Secretary and General Sales Agent; Richard Garlick, Treasurer. Sales made by the company.—*See Alice Furnace, page 257.*

Number of rolling mills and steel works in the Mahoning Valley: 18. Of these 2 make Bessemer steel, one makes open-hearth steel, and one open-hearth steel plant is projected.

LAKE COUNTIES.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Cuyahoga, Lorain, and Lucas Counties.

COKE FURNACES—10 COMPLETED AND 2 BUILDING.

Central Furnaces, American Steel and Wire Company of New Jersey, Chicago. Furnaces at Cleveland, Ohio. Three stacks; fuel, coke.—*For description see page 41.*

Cleveland (The) Furnace Company, Perry-Payne Building, Cleveland. One stack, 85 x 20, built in 1902–3 and first blown in August 21, 1903; four Julian Kennedy two-pass stoves, each 22 x 90; fuel, by-product coke; ore, Lake Superior; product, foundry, malleable Bessemer, and basic pig iron; annual capacity, 160,000 tons. Brand, "Cleveland." Connected with the furnace are by-product coke ovens with an annual capacity of 120,000 net tons. D. B. Meacham, President; S. W. Croxton, Vice-President; C. Birdsall Smith, Secretary and Treasurer; David T. Croxton, General Manager. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Emma Furnace, American Steel and Wire Company of New Jersey, Chicago. Furnace at Cleveland, Ohio. One stack; fuel, coke.—*For description see page 41.*

Lorain Furnaces, The National Tube Company, (of Ohio,) Lorain. Furnaces at Lorain. Two completed stacks and two stacks building; fuel, coke.—*For description see page 31.*

Newburgh Furnace, American Steel and Wire Company of New Jersey, Chicago. Furnace at Cleveland, Ohio. One stack; fuel, coke.—*For description see page 42.*

River Furnace, The River Furnace and Dock Company, lessee, Perry-Payne Building, Cleveland. One stack, 73 x 17, built in 1879; remodeled in 1889 and 1895; rebuilt in 1902; three Foote stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, forge, and malleable pig iron; annual capacity, 75,000 tons. Brands, "River," "Douglas," and "Lincoln." James Corrigan, President; Price McKinney, Vice-President; J. E. Ferris, Secretary and Treasurer; W. S. McFarland, Superintendent. Selling agents, Corrigan, McKinney & Co., Cleveland. (Owned by the Cleveland Iron Company.)—*Active in 1903.*

Toledo (The) Furnace Company, Western Reserve Building, Cleveland. Furnace at Toledo, Lucas county. One stack, 80 x 20, built in 1902–3 and first put in operation May 31, 1903; four Kennedy stoves, each 22 x 92; fuel, coke; ore, Lake Superior; product, Bessemer, basic, malleable, and foundry pig iron; annual capacity, 130,000 tons. Brand, "Toledo." H. G. Dalton,

President and Treasurer; Samuel Mather, Vice-President; E. P. Williams, Secretary and Assistant Treasurer; E. H. Williams, General Manager. Selling agents, Pickands, Mather & Co., Cleveland.

Number of coke furnaces in the Lake Counties: 10 completed and 2 building stacks. No charcoal stacks in the Lake Counties.

ROLLING MILLS AND STEEL WORKS—17.

American Works, American Steel and Wire Company of New Jersey, Chicago. Works at Cleveland, Ohio.—*See page 42.*

Cleveland (The) Hardware Company, Lake st., between Belden and Kirtland sts., Cleveland. Built in 1879; destroyed by fire in June, 1891, and entirely rebuilt; 2 heating furnaces with 2 Duff gas producers and one 10-inch train of rolls; product, shapes for wagon, carriage, and sleigh hardware rolled from soft steel; annual capacity, 16,000 tons. Fuel, bituminous coal and manufactured gas. 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, 11,000 tons. Fuel, natural gas. W. W. Balkwill, President; N. P. Bowler, Vice-President and Treasurer; F. B. Squire, Secretary and Assistant Treasurer.

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, Chicago, Illinois. Works at Cleveland, Ohio.—*For description see page 43.*

Crescent Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cleveland, Ohio.—*For description see page 55.*

Elyria (The) Iron and Steel Company, Elyria, Lorain county. Built in 1902–3 and first put in operation in the fall of 1903; equipped with a number of heating furnaces and 3 trains of rolls (one 20 and two 16-inch); product, small structural shapes, flats, and tie plates made from old rails and purchased steel billets; also tubing suitable for the manufacture of bedsteads; may re-

roll rails into light sections; annual capacity, 50,000 tons. Fuel, coal. W. S. Miller, President; H. B. Wick, Vice-President and Treasurer; J. L. Barnard, Secretary; W. E. Miller, Manager; E. W. Gage, General Sales Agent; Willis McKee, Superintendent. Eastern Sales Agents, Miller, Thornburgh & Co., Havemeyer Building, New York.

Empire (The) Rolling Mill Company, Cleveland. Built in 1900 and first put in operation December 15, 1900; 2 puddling furnaces, 6 busheling furnaces, one forge fire, 2 gas heating furnaces, and 2 trains of rolls (one 12-inch roughing and one 10-inch Belgian); product, iron and steel bars; annual capacity, 20,000 tons. Fuel, manufactured gas. C. G. Barkwill, President; W. J. Morgan, Vice-President; D. R. James, Secretary and Treasurer; J. D. Paton, Superintendent.

H. P. Works, American Steel and Wire Company of New Jersey, Chicago. Works at Cleveland, Ohio.—*See pages 43–4.*

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 2 trains of rolls (one 18-inch muck and one 10-inch finishing); product, bar iron, all consumed by the company in the manufacture of bolts and nuts; annual capacity, 31,600 tons of bar iron. Fuel, coal in the rolling mill and oil in the bolt and nut works. W. C. Scofield, President; Frank R. Scofield, Vice-President; C. W. Scofield, Secretary and Treasurer.

Lorain Works, The National Tube Company, (of Ohio,) Lorain. Works at Lorain.—*For description see page 32.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Chicago. Works at Newburgh, Ohio.—*See page 44.*

Otis (The) Steel Company, Limited, Cleveland. Built in 1873–4 and put in operation January 1, 1875; 9 Siemens heating furnaces, 5 hammers, 10 open-hearth steel furnaces, (two 10-gross-ton acid, with an annual capacity of 15,000 tons of ingots, and five 18 and three 25-gross-ton basic, with an annual capacity of 80,000 tons of ingots,) and 3 trains of rolls (one 30, one 31, and one 34-inch); product, steel plates, bar steel, forgings, and castings; annual capacity, 50,000 tons of rolled products, 15,000 tons of forged products, and 10,000 tons of castings. Fuel, coal and producer gas. Brand, "Otis." George Bartol, General Manager; H. F. Deverell, Secretary in America; J. T. Smith, A. P. Head, and J. E. Touch, Directors; B. W. Head, Secretary in England. Selling agents, Thorpe, Platt & Co., 97–103 Cedar st., New York; C. A. Thompson, 516 North Third st., St. Louis.

Toledo Works, Republic Iron and Steel Company, Chicago. Works at East Toledo, Ohio.—*For description see page 87.*

Toledo Works, (Factory D,) Shelby Steel Tube Company, Pittsburgh. Works at Toledo, Lucas county, Ohio.—*For description see page 39.*

Union (The) Rolling Mill Company, Cleveland. Works and office 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, (8 and 9-inch guide, 18-inch bar, and 3-high muck,) 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, 175 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 works at Cleveland.—*For description see page 157.*

Number of rolling mills and steel works in the Lake Counties: 17. Of these 2 make Bessemer steel and 4 make open-hearth steel.

HANGING ROCK DISTRICT.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Lawrence, Jackson, and Scioto Counties.

COKE AND BITUMINOUS COAL AND COKE FURNACES—12.

Belfont Furnace, Belfont Iron Works Company, Ironton, Lawrence county. One stack, 66 x 16, built in 1868; rebuilt in 1895 and 1902; 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 1903. See Belfont Iron Works, page 319.*

Globe Furnace, Globe Iron Company, Jackson, Jackson county. One stack, 76 x 16½, (jacket built to receive an 18½-foot bosh,) built in 1900–1 and first blown in February 12, 1901; three Foote stoves, each 18 x 75; fuel, ½ raw coal and ½ coke; ore, native; product, ferro-silicon and soft foundry pig iron; 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; W. R. Thomas, New York; C. L. Peirson & Co., Boston. (Formerly called Fulton Furnace.)—*Active in 1903.*

Hamilton Furnace, The Hanging Rock Iron Company, Hanging Rock, Lawrence county. One stack, 65 x 16, built in 1883 and first blown in in March, 1886; one Foote and three Whitwell stoves; fuel, Pocahontas coke; ores, native block and limestone and Lake Superior; product, Bessemer, foundry, and malleable pig iron; annual capacity, 45,000 tons. Brand, "Hamilton." D. B. Meacham, President; Joseph K. Pollock, Vice-President; James Bull, Secretary; Edwin McBirney, Treasurer. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Lawrence Furnace, The Lawrence Furnace Company, George N. Gray, Receiver, Ironton. Furnace at Culbertson, Lawrence county. One stack, 65 x 14, built in 1889–90, using machinery removed from the Waldorf Furnace, at Irontown, West Virginia; blown in in March, 1891; rebuilt in 1901; two Gordon-Whitwell-Cowper stoves; fuel, raw coal and West Virginia coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 15,000 tons. Brand, "Lawrence." John Peters, Jr., President, Manager, and Selling Agent; A. B. Cole, Vice-President; George Peters, Secretary.—*Active in 1903.*

Marting (The) Iron and Steel Company, Ironton, Lawrence county. 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; T. J. Gilbert, Secretary and Treasurer. Selling agents, Matthew Addy & Co., Cincinnati.—*Active in 1903.*

Sarah Furnace, 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 1903.* *See Kelly Nail Works, page 319.*

Star Furnace, Star Furnace Company, Jackson, Jackson county. 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 softener, and Nos. 1 and 2 soft foundry pig iron; annual capacity, 16,000 tons. Brand, "Star." B. Kahn,

President; C. O. Brown, Secretary; L. V. Brown, Manager. Selling agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Union Furnace, Union Iron and Steel Company, New York. Furnace at Ironton, Ohio. One stack; fuel, coke.—*See page 106.*

Wellston (The) Iron and Steel Company, Wellston, Jackson county. 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; product, car-wheel, strong foundry, Bessemer, and malleable pig iron; total annual capacity, 80,000 tons. J. C. Clutts, President; H. S. Willard, Jr., Vice-President; H. S. Willard, Secretary and Treasurer; J. H. Browne, Auditor; E. B. Willard, Jr., Superintendent. Sole sales agents, Rogers, Brown & Co., New York and branch houses.—*Active in 1903.*

Number of coke and bituminous coal and coke furnaces in the Hanging Rock District of Ohio: 12 stacks. Of these 9 use coke alone and 3 use raw coal and coke mixed.

CHARCOAL FURNACES—7.

Bloom Furnace, The Clare Iron Company, Bloom Switch, Scioto county. One stack, 35 x 10, built in 1832 and rebuilt in 1846; burned December 7, 1887, and rebuilt in the spring of 1888; 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, Treasurer, and Thomas McConnell, Secretary and Superintendent, Portsmouth, Ohio.—*Active in 1903.*

Centre Furnace, Mrs. Nannie H. Kelley, Ironton, Lawrence county. One stack, 40 x 10½, built in 1837; open top; ore, native limestone; product, pig iron especially adapted for cylinders, pulleys, and all kinds of machinery where strength is required; annual capacity, 4,500 tons. Charcoal pits are connected with the furnace. Selling agents, Matthew Addy & Co., Cincinnati and branch houses.—*Active in 1903.*

Hecla Furnace, Hecla Charcoal Iron Company, lessee, Ironton, R. F. D., Route No. 2, Lawrence county. One iron stack, 52 x 10, built in 1887–90 to take the place of a stone stack built in 1833; cold blast; ores, local siderite and limonite calcined in

three ovens with wood and charcoal; limestone calcined with charcoal braise in oven before using; 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. E. J. Bird, Jr., President; George W. Keye, Vice-President; F. J. Horschel, Secretary and Treasurer. Sales made by the company. (Owned and formerly operated by the Hecla Iron and Mining Company.)—*Active in 1903.*

Jefferson Furnace, Jefferson Iron Company, Oak Hill, Jackson county. One stack, 40 x 11½, 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, 5,000 tons. Brand, "Anchor." Charcoal pits with an annual capacity of 400,000 bushels are connected with the furnace. J. C. Jones, President; Joseph J. Jones, Secretary; Eben J. Jones, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; J. H. Hillman & Co., Pittsburgh.—*Active in 1903.*

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 made by the company.—*Olive active in 1903; Buckhorn idle for several years, but may be remodeled and blown in shortly.*

Vesuvius Furnace, Ironton Coal and Iron Company, Ironton, Lawrence county. One stack, 33 x 10½, built in 1832; rebuilt in 1886; cold blast; open top; ore, native limestone; product, pig iron suitable for the manufacture of car wheels and chilled rolls; annual capacity, 3,000 tons. Brand, "Vesuvius." J. Harry Lee, President, 512 North Calvert st., Baltimore, Md.; George L. Estabrook, Secretary and Treasurer, Bullitt Building, Philadelphia; George N. Gray, General Manager, Ironton. (Formerly operated under lease by the Vesuvius Charcoal Iron Company.)—*Active in 1903. Now idle and for sale or lease.*

Number of charcoal furnaces in the Hanging Rock District: 7.

Total number of furnaces in this District: 19 stacks. Of these 9 stacks use coke, 3 use bituminous coal and coke mixed, and 7 use charcoal.

ROLLING MILLS AND STEEL WORKS—4.

Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. Built in 1852; 4 gas heating furnaces, one train of rolls, 126 cut-nail machines, 36 wire-drawing blocks, and 60 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. B. H. Burr, President and General Manager; Robert Peebles, Vice-President; S. G. Gilfillan, Secretary and Treasurer.—*See Belfont Furnace, page 315.*

Eagle Works, Republic Iron and Steel Company, Chicago. Works at Ironton, Ohio.—*For description see page 86.*

Kelly Nail Works, Kelly Nail and Iron Company, Ironton, Lawrence county. 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, and plain and galvanized wire; annual capacity, 250,000 kegs of cut nails, 30,000 tons of wire, and 700,000 kegs of wire nails. Fuel, coal. 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 316.*

Portsmouth Steel Company, Wheeling, West Virginia. Works at Portsmouth, Scioto county, Ohio. Built in 1871, destroyed by fire in June, 1898, rebuilt in 1898–9, and put in operation in April, 1899; 9 gas heating furnaces, 2 annealing furnaces, 6 trains of rolls, (one 3-high 8 and one 12-inch guide, one 2-high 18-inch bar, one 3-high 18-inch bar, and one 2-high 20 x 48-inch and one 2-high 26 x 72-inch plate,) one 4-ton hammer, four 35-gross-ton open-hearth steel furnaces, (one acid and 3 basic,) and two 4-hole soaking pits; first acid and basic steel made in April, 1899; product, steel ingots, steel castings, billets, plates, and bars; annual capacity, 75,000 tons of basic ingots, 25,000 tons of acid ingots, 600 tons of steel castings, 40,000 tons of billets, 25,000 tons of plates, and 15,000 tons of bars. Fuel, manufactured gas. An iron and steel foundry with an annual capacity of 1,400 tons is connected with the works. Two 3-high plate mills may be added. W. L. Glessner, President; Alex. Glass, Vice-President; E. T. Conners, Secretary and Treasurer. Selling agents, J. F. Corlett & Co., Cleveland; J. L. Adams & Co.,

Cincinnati; James O'Donnell, 36 La Salle st., Chicago; G. W. Weyer, St. Louis; George W. House, Detroit. (Formerly called the Burgess Steel and Iron Works and operated by the Crucible Steel Company of America; acquired by the Portsmouth Steel Company in April, 1902, and first put in operation by that company in May, 1902.)

Number of rolling mills and steel works in the Hanging Rock District of Ohio: 4. Of these one makes open-hearth steel.

INTERIOR COUNTIES.

Embraces Blast Furnaces, Rolling Mills, Steel Works, and Pig and Scrap Iron Bloomaries located in Franklin, Perry, Tuscarawas, Muskingum, Butler, Guernsey, Stark, Knox, Summit, Hancock, Huron, Portage, Marion, Richland, Licking, and Miami Counties.

COKE AND BITUMINOUS COAL AND COKE FURNACES—9.

Columbus Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Columbus, Ohio. Two stacks; fuel, coke.—*See page 6.*

Columbus (The) Iron and Steel Company, Columbus, Franklin county. Two stacks, each 75 x 17, one built in 1900 and blown in in October, 1900, and the other built in 1900–1 and blown in in February, 1901; eight Foote stoves; fuel, West Virginia and Connellsville coke; ore, Lake Superior; product, Bessemer, basic, malleable, and foundry pig iron; total annual capacity, 150,000 tons. Brand, "Buckeye." Two McMyler slag and cinder removing machines for the production of granulated slag are connected with the furnaces. The company is erecting 100 coke ovens at Marting, Fayette county, W. Va. J. G. Battelle, President; H. A. Marting, Vice-President; J. H. Frantz, Treasurer and General Manager; W. W. Marting, Secretary; Madison Mains, Superintendent. Sales made by the company.—*Active in 1903.*

Dover Furnace, The Penn Iron and Coal Company, Canal Dover, Tuscarawas county. Cleveland office, 811 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. Brands, "Tuscarawas" and "Dover" for foundry pig iron. Equipped with one Davies pig-iron casting machine. S. W. Croxton, President and General Manager; C. H. Davis, Vice-President; H. S. Ream, Secretary; J. P. Burton, Treasurer; James E. Moyer, Superintendent.—*Active in 1903.*

Fieser & Bentley, Columbus, Franklin county. Three furnaces in Ohio, all leased: Bessie 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;" (owned by the Columbus and Hocking Coal and Iron Company, The Wyandotte, Columbus.) New York Furnaces, at Shawnee, Perry county; two stacks: one, 50 x 14, built in 1877 and blown in November 10, 1877, has two cast-iron stoves; the other, 65 x 16, built in 1887 and blown in December 15, 1887, has two Gordon-Whitwell-Cowper stoves; fuel, raw coal and coke; ores, native from the furnace property and Lake Superior; product, silvery and "American Scotch" pig iron; total annual capacity, 54,000 tons; brand, "Hocking;" (owned by the Ohio Mining and Manufacturing Company, 156 Fifth avenue, New York.) Total annual capacity of the three furnaces, 72,000 tons. Linn Bentley, Superintendent. Selling agents, Fieser & Bentley, Columbus and Chicago.—*Active in 1903.*

Zanesville Furnace, Carnegie Steel Company, Pittsburgh. Furnace at Zanesville, Ohio. One stack; fuel, coke.—*For description see page 9.*

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: 9 stacks. Of these 6 use coke alone and 3 use bituminous coal and coke mixed.

ROLLING MILLS AND STEEL WORKS—33 COMPLETED, 1 BUILDING, 1 PARTLY ERECTED, AND 2 PROJECTED.

Alliance Works, American Steel Foundries, New York. Works at Alliance, Ohio.—*For description see page 95.*

American (The) Rolling Mill Company, Middletown, Butler county. Branch office, Cincinnati. Built in 1900–1 and first put in operation February 7, 1901; 8 gas-fired heating furnaces, (4 sheet and 4 pair,) 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 basic open-hearth steel furnaces (one 35 and one 50-gross-ton) with an annual capacity of 40,000 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, 30,000 tons of bars and 11,000 tons of sheets. Fuel, bituminous coal and producer gas. A galvanizing plant is connected with the works. George M. Verity, President, Treasurer, and General Manager;

W. T. Simpson, Vice-President; R. C. Phillips, Secretary; R. B. Carnahan, General Superintendent.

Buckeye (The) Steel Castings Company, Columbus, Franklin county. Steel casting plant on South Parsons ave. Built in 1901-2 and first steel made in November, 1902; 3 open-hearth steel furnaces (one 12-gross-ton acid and two 20-gross-ton basic); product, car couplers and general castings; annual capacity, 11,000 tons of acid and 36,000 tons of basic castings. Fuel, oil. The company also operates a malleable iron casting plant at Russell and Fourth sts.; daily capacity, 60 tons. W. F. Goodspeed, President and Treasurer; R. S. Warner, Vice-President; S. P. Bush, Second Vice-President and General Manager; Arno Eberlein, Secretary. (Formerly operated by the Buckeye Malleable Iron and Coupler Company.)

Byesville Works, The United Sheet and Tin Plate Company, Marietta. Partly erected works at Byesville.—*For description see page 150.*

Cambridge Rolling Mill Company, Cambridge, Guernsey county. Built in 1901 and first put in operation in that year; one Lauth heating furnace and 7 trains of 14-inch rolls; product, Bessemer steel angles, flats, rounds, U bars, channel flats, light rails, etc.; annual capacity, 30,000 tons. Fuel, bituminous coal and natural gas. T. W. Scott, President; H. P. Woodworth, Vice-President and Secretary; C. S. Sheppard, Treasurer.

Cambridge Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cambridge, Ohio.—*For description see page 54.*

Canton Crucible Steel Works, Canton, Stark county. Built in 1895; twelve 2-pot crucible steel-melting holes; first steel made April 15, 1895; one heating furnace and 2 hammers (one 600 and one 1,500-lb.); product, high-grade tool steel of all kinds, wire-drawing plates, and steel castings; annual capacity, 450 tons. Fuel, coke. (Owned by Isaac Bialosky, 118 Hill st., Cleveland.)—*Idle and for sale or lease.*

Canton Steel Works, Canton Steel Company, Canton, Stark county. General office, Frick Building, Pittsburgh, Pa. Built in 1872; 12 heating furnaces, 3 welding furnaces, 5 hammers, one 10-inch, one 12-inch, and one 20-inch train of rolls, 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; annual capacity, 20,000 gross tons of ingots and 18,000 tons of rolled products. Fuel, bituminous coal. Brand, "Canton." Frank B. Smith, President; Charles E. Clapp, Vice-President; Alexander Thomas, Secretary; Julius Bieler, Treasurer; R. H. Bulley, General Manager.

Canton Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Canton, Ohio.—*For description see page 54.*

Carnahan Tin Plate and Sheet Company, Canton, Stark county. 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, 16,000 tons. Fuel, bituminous coal and producer gas. J. E. Carnahan, President; Ed. A. Langenbach, Vice-President; W. M. Blecker, Secretary, Treasurer, and General Manager.—*See Tinplate and Terne Plate Works.*

Columbus Iron Works, Standard Chain Company, Pittsburgh. Works at Columbus, Ohio.—*For description see page 148.*

Columbus (The) Malleable Iron Company, Columbus, Franklin county. Works at Curtis and Lexington aves. One 10-gross-ton acid open-hearth steel furnace built in 1900; destroyed by fire in 1901 and rebuilt in 1902; now equipped with two acid open-hearth steel furnaces (one 10 and one 25-gross-ton) and 4 annealing furnaces; product, malleable iron castings, but can make steel castings; daily capacity, 25 tons of malleable castings. Fuel, producer gas. Charles A. Klie, President and Treasurer; H. T. Irvin, Secretary and General Manager.

Columbus Steel Works, Carnegie Steel Company, Pittsburgh. Works at Columbus, Ohio.—*For description see page 10.*

Corns Works, Republic Iron and Steel Company, Chicago. Works at Massillon, Ohio.—*For description see page 85.*

Coxey Steel and Silica Sand Company, James Israel, Receiver, Mount Vernon, Knox county. Built in 1900–1; 2 Siemens acid open-hearth steel furnaces (one 15 and one 25-gross-ton) and one annealing furnace; also 2 cupolas (one 60 and one 80-inch) for gray iron castings; product, acid open-hearth, brass, bronze, and gray iron castings; first steel castings made October 19, 1901; annual capacity, 2,500 tons of open-hearth steel castings. Fuel, natural gas. Jacob S. Coxey, President. (Two 4-pot crucible steel-melting furnaces abandoned. Formerly operated by Jacob S. Coxey.)—*Company may be reorganized.*

Cuyahoga Falls Plant, Cuyahoga Wire and Fence Company, Cuyahoga Falls, Summit county. Consolidation of the Cuyahoga Iron and Steel Company, the E. A. Henry Wire Company, and the Summit Wire Company. Built in 1901 and first put in operation June 1, 1901; one Lauth continuous heating furnace, 3 trains of rolls, 237 wire-drawing blocks, and 30 wire-nail machines; product, wire rods, wire nails, fence wire, coppered and

bright market wire, etc.; annual capacity, 25,000 tons of wire rods, 15,000 tons of wire, and 45,000 kegs of wire nails. Fuel, bituminous coal. A. F. Halsted, Secretary; James Belden, Manager. (Formerly operated by the Cuyahoga Steel and Wire Company.)—*Company being reorganized.*

Dennison Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Dennison, Ohio.—*For description see page 55.*

Dover Forge, The Dover Forge and Iron Company, Canal Dover, Tuscarawas county. Building; construction commenced in 1903; will probably be completed and put in operation in July, 1904; 6 double puddling furnaces, 3 scrap furnaces, 2 direct-fired heating furnaces, one squeezer, and 2 stands of 22-inch 3-high bar rolls; product, iron forging billets, muck bar, scrap bar, iron sheet bars, and charcoal iron tinplate bars; annual capacity, 30,000 tons. Fuel, coal. A forge for the manufacture of charcoal blooms, slabs, and billets is connected with the works. A. J. Krantz, President; James Rees, Vice-President; J. A. Krantz, Treasurer; A. Beard, Secretary. Sales made by the company.—*See Dover Forge, pages 327–28.*

Dover Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Canal Dover, Ohio.—*For description see page 55.*

Dresden Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Dresden, Ohio.—*For description see page 55.*

Falls Hollow Staybolt Company, Cuyahoga Falls, Summit county. Built in 1865, rebuilt in 1884, and remodeled in 1903; 2 heating furnaces and one 10-inch train of rolls; product, hollow and solid staybolt iron made from the best quality of double refined charcoal iron or steel; annual capacity, 1,500 tons. Fuel, oil. Brands, "Falls Hollow Staybolt Iron," "Falls Hollow Staybolt Steel," and "Falls Solid Staybolt Iron." C. M. Walsh, Proprietor and General Manager. Selling agents, Republic Railway and Appliance Company, Lincoln Trust Building, St. Louis; Joseph R. Lehmer, 1218 Farnam st., Omaha, Neb.; John Livingstone, 56 Royal Insurance Building, Montreal, Canada; Berger, Carter & Co., 150 Beale st., San Francisco; A. M. Castle & Co., 54–60 South Canal street, Chicago; Abbott L. Wright, 216 Colorado Building, Denver, Colorado.

Guernsey Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cambridge, Ohio.—*For description see page 56.*

Independent (The) Rolling Mill Company, Cuyahoga Falls, Summit county. Built and put in operation in 1902; 2 busheling and 4 Lauth heating furnaces, (2 board piling and 2 finishing,) 2 trains of rolls, (one 18-inch muck and one 10-inch finishing,) and one squeezer; product, muck bar, bar iron, light

structural shapes, and light iron rails; annual capacity, 28,000 tons. Fuel, coal. May add an 18-inch bar mill. William Wilkoff, President; S. H. Pitkain, Vice-President; F. T. Smith, Treasurer; H. B. Hamlin, Secretary. Sales made by the company. (Formerly operated by the Ohio Steel and Iron Specialty Company.)

Marion (The) Steam Shovel Company, Marion, Marion county. 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. Edward Huber, President, George W. King, Vice-President and General Manager, A. E. Cheney, Secretary and Sales Manager, and Frank A. Huber, Treasurer, Marion; George W. Barnhart, Pacific Coast Manager, San Francisco.

Muskingum (The) Valley Steel Company, Zanesville, Muskingum county. Built in 1900–1 and first put in operation in October, 1901; 5 combination sheet and pair furnaces, 2 billet heating furnaces, 3 double annealing furnaces, one 3-high sheet bar mill, 5 stands of hot sheet rolls, 2 stands of roughing rolls, and 2 stands of 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, 14,000 tons. Fuel, natural gas. W. S. Fiscus, President; R. F. Geary, Vice-President; G. W. Lloyd, Secretary and Treasurer; W. E. Lloyd, Manager. General sales agents, Goff, Horner & Co., Limited, Frick Building, Pittsburgh. (Formerly operated by the Curtis Sheet Steel and Corrugating Company.)

Newark Iron and Steel Company, Wm. E. Miller, Receiver, Newark, Licking county. Built in 1897 and enlarged in 1901; 2 heating furnaces, one forge fire, and one 18-inch train of rolls; one 10-gross-ton acid open-hearth steel furnace built in 1901; first steel made August 1, 1901; product, open-hearth steel castings, forging steel, high-pressure and hydraulic fittings, and oil-well supply specialties; annual capacity, 3,000 tons of steel castings and 3,000 tons of rolled products. Fuel, coal and natural gas.

New Philadelphia Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Philadelphia, Ohio.—*For description see page 58.*

Norwalk Steel and Iron Company, (Incorporated,) Norwalk, Huron county. Built in 1902–3; one 13-gross-ton modified basic open-hearth steel furnace; first steel made March 16, 1903; 4 ham-

mers (one 5-ton, one 3-ton, one 600-lb., and one 250-lb.) and one 24-inch train of rolls; product, agricultural implement steel, safe, vault, and high-grade tool steel, and forgings; annual capacity, 10,000 tons. Fuel, natural gas, bituminous coal, and producer gas. J. E. Carnahan, President; James G. Gibbs, Secretary and Treasurer; Edward E. Erickson, General Manager; A. M. Beattie, Vice-President and Attorney; C. T. Torsell, Superintendent.

Ohio Rolling Mill, A. M. Snyder, owner, Cleveland. Works at Findlay, Hancock county. Built in 1900 and first put in operation June 10, 1900; 3 double puddling furnaces, 4 sand bottom furnaces, 2 heating furnaces, 2 trains of rolls, (one 20-inch muck and one 10-inch guide,) and one 2,000-lb. hammer; product, bar iron; annual capacity, 10,000 tons. Fuel, bituminous coal. (Formerly operated by the Ohio Rolling Mill Company.) —*For sale.*

Piqua Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Piqua, Ohio.—*For description see pages 58–9.*

Shelby Works, (Factory A,) Shelby Steel Tube Company, Pittsburgh. Works at Shelby, Ohio.—*For description see pages 38–9.*

Stark Rolling Mill, Stark Rolling Mill Company, Canton, Stark county. Built in 1900–1 and first put in operation October 1, 1901; one heating, 5 pair, 5 sheet, and 5 annealing furnaces, 6 hot mills, (three 38, one 44, and two 34-inch,) and two 24 x 44-inch cold mills; product, black sheets, galvanized sheets, pickled and cold-rolled sheets, etc.; annual capacity, 15,000 tons of rolled products. Fuel, coal and manufactured gas. A galvanizing plant is connected with the mill. John E. Carnahan, President; Joseph Biechele, Vice-President and Treasurer; Ed. A. Langenbach, Secretary; W. W. Irwin, Superintendent.

Tuscora Works, The United Sheet and Tin Plate Company, Marietta. Works at Newcomerstown.—*For description see page 150.*

United (The) Steel Company, Canton, Stark county. Built in 1903–4; not put in operation down to June 20, 1904; three 45-gross-ton Siemens open-hearth steel furnaces (one acid and two basic) with an annual capacity of 30,000 tons of acid and 60,000 tons of basic ingots and castings, one 4-hole soaking pit, and one 48-inch universal mill; product, slabs, billets, sheet bars, and universal plates; annual capacity, from 150,000 to 300,000 tons of slabs and billets or 100,000 tons of sheet bars or universal plates. Fuel, natural and producer gas. Three additional 45-gross-ton open-hearth steel furnaces may be built. John E. Carnahan, President; Joseph Biechele, Vice-President; Ed. A. Langenbach, Manager; Harry R. Jones, Secretary and Treasurer.

Zanesville Iron Works, The Zanesville Iron Company, The Guardian Trust and Safe Deposit Company, Receiver, Zanesville, Muskingum county. Works originally built in 1848; now comprise one double and 19 single puddling furnaces, one scrap furnace, 3 coal and 3 gas heating furnaces, one reheating furnace, one hammer, and 4 trains of rolls (one 8-inch, one 9-inch, one 10-inch, and one 16-inch); product, iron and steel bars, bands, and shapes; annual capacity, 45,000 tons. Fuel, coal and natural and manufactured gas. S. R. Wells, President and Treasurer; A. S. Farber, Vice-President; J. A. Wells, Secretary.—*For sale.*

PROJECTED ROLLING MILLS AND STEEL WORKS—2.

Dithridge Steel Car Works, Dithridge Steel Car Company, 76 Montgomery street, Jersey City, New Jersey. Contemplates erecting works at White City, near Newcomerstown, Tuscarawas county, Ohio, to be equipped with 20 heating furnaces, 5 annealing furnaces, 10 forge fires, 3 trains of rolls, and 10 hammers; product, plates, car axles, etc.; annual capacity, 100,000 tons of rolled and forged products. Brand, "Dithridge." Trade-mark, interlocked triangles. Fuel, gas made from bituminous coal and oil. A basic open-hearth steel-casting plant may also be erected; daily capacity, 50 tons. Also works for the manufacture of steel freight cars; daily capacity, 40 cars. Also an iron foundry for the manufacture of car wheels; daily capacity, 320 wheels. George W. Dithridge, President; Edward Lewis Dithridge, Vice-President; Francis McFarlan, Secretary and Treasurer.

National (The) Steel Castings Company, Williamson Building, Cleveland. Contemplates building at Ravenna, Portage county, one 2-gross-ton Tropenas steel converter; product, to be steel castings for general machinery, automobile, and electrical work; estimated annual capacity, 1,200 tons. J. R. McQuigg, Vice-President; H. O. Secrest, Secretary; W. B. Newcomb, Treasurer; C. H. Stamp, General Manager.

Number of rolling mills and steel works in the Interior Counties of Ohio: 33 completed, one building, one partly erected, and 2 projected. Of these one makes Bessemer steel, one makes Robert-Bessemer steel, and one Tropenas plant for the manufacture of steel castings is projected; 9 make open-hearth steel, one open-hearth steel plant is partly erected, and one open-hearth steel plant is projected; and one makes crucible steel.

BUILDING PIG AND SCRAP IRON BLOOMARIES—1.

Dover Forge, The Dover Forge and Iron Company, Canal Dover, Tuscarawas county. Building; construction commenced in 1903;

will probably be completed and in operation in July, 1904; 6 knobbling fires and one 5,000-lb. steam hammer; product, charcoal blooms, slabs, and billets for the company's use and for sale made from charcoal pig iron or scrap iron or steel; annual capacity, 7,500 tons. Fuel, charcoal.—*See Dover Forge, (Rolling Mills,) page 324.*

Number of building pig and scrap iron bloomaries in the Interior Counties of Ohio which make blooms or billets for sale: one.

OHIO RIVER COUNTIES.

Embraces Blast Furnaces, Rolling Mills, and Steel Works in Belmont, Jefferson, and Washington Counties; also in a part of Columbiana County.

COKE FURNACES—8 COMPLETED AND 1 BUILDING.

Bellaire Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Bellaire, Ohio. Two stacks; fuel, coke.—*For description see page 5.*

La Belle Furnaces, La Belle Iron Works, Steubenville. One completed stack and one stack building; fuel, coke.—*See page 151.*

Martins Ferry Furnace, Wheeling Steel and Iron Company, Wheeling, West Virginia. Furnace at Martins Ferry, Ohio. One stack; fuel, coke.—*For description see page 153.*

Mingo Furnaces, Carnegie Steel Company, Pittsburgh. Furnaces at Mingo Junction, Ohio. Three stacks; fuel, coke.—*See pages 7-8.*

Steubenville Furnace, (Riverside Department,) National Tube Company, Pittsburgh. Furnace at Steubenville, Ohio. One stack; fuel, coke.—*For description see page 35.*

Number of coke furnaces in the Ohio River Counties: 8 completed stacks and one stack building. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—10 COMPLETED AND 1 PROJECTED.

Aetna-Standard Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Bridgeport, Ohio.—*See page 53.*

Beaver Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Lisbon, Ohio.—*For description see page 54.*

Bellaire Steel Works, Carnegie Steel Company, Pittsburgh. Works at Bellaire, Ohio.—*For description see page 10.*

Laughlin Department, Whitaker-Glessner Company, Wheeling, West Virginia. Works at Martins Ferry, Ohio.—*See page 155.*

Laughlin Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Martins Ferry, Ohio.—*For description see page 57.*

Marietta Works, The United Sheet and Tin Plate Company, Marietta. Works at Marietta.—*For description see page 150.*

Mingo Steel Works, Carnegie Steel Company, Pittsburgh. Works at Mingo Junction, Ohio. 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.—*For description see pages 13–14.*

Pope Tin Plate Company, Wheeling, West Va. Branch office, 421 Wood st., Pittsburgh. Works at Steubenville, Jefferson county, Ohio. 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 hot rolls, and 10 stands of cold rolls; product, black plates or sheets for tinning; annual capacity, about 25,000 tons. Fuel, natural and producer gas. Charles E. Pope, President; John F. Kraft, Secretary and Treasurer. Selling agents, Charles E. Pope & Co., Pittsburgh.—*See Tinplate and Terne Plate Works.*

Steubenville Works, La Belle Iron Works, Steubenville. Works at Steubenville.—*For description see pages 151–52.*

Wellsville Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wellsville, Ohio.—*For description see page 61.*

PROJECTED STEEL PLANTS—1.

Menough (The) Foundry Company, Incorporated, Wellsville, Columbiana county. Now makes light and heavy gray iron castings; contemplates adding one 10-gross-ton basic open-hearth steel furnace or a small Bessemer converter in the summer or fall of 1904; product, to be light and heavy castings; present annual capacity, 5,000 tons of gray iron castings. Fuel, natural gas. 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: 10 completed and one projected. Of these 2 make Bessemer steel and one makes open-hearth steel. In addition one plant to make either Bessemer or open-hearth steel is projected.

SUMMARY FOR OHIO.

Total number of blast furnaces in Ohio: 61 completed, 4 building, and one projected. Of these 48 use coke alone, 4 coke stacks are being built, and one coke stack is projected; 6 stacks use bituminous coal and coke mixed, and 7 stacks use charcoal.

Total number of rolling mills and steel works in Ohio: 82 completed, one building, one partly erected, and 3 projected. Of these 7 make Bessemer steel, one Bessemer steel plant is projected, one makes Robert-Bessemer steel, and one Tropenas steel plant is projected; 16 make open-hearth steel, one open-hearth steel plant is partly erected, and 3 open-hearth steel plants are projected; and one makes crucible steel.

Number of pig iron and scrap iron bloomaries in Ohio which make blooms or billets for sale: one building.

INDIANA.

ROLLING MILLS AND STEEL WORKS—36 COMPLETED, 3 BUILDING, AND 1 PROJECTED.

Alexandria Works, Republic Iron and Steel Company, Chicago. Works at Alexandria, Indiana.—*For description see page 84.*

American Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Elwood, Indiana.—*For description see page 54.*

Anderson Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Anderson, Indiana.—*For description see page 54.*

Anderson Works, American Steel and Wire Company of New Jersey, Chicago. Works at Anderson, Indiana.—*See page 42.*

Atlanta Rolling Mill and Tin Plate Company, Atlanta, Hamilton county. Building; construction commenced in 1903; will probably be completed and in operation in August, 1904; 6 sheet heating furnaces, 2 annealing furnaces, and 10 black plate mills (four 32 and two 36-inch hot and four 34-inch cold); product, black plates for tinning; annual capacity, 14,000 tons. Fuel, manufactured gas. J. M. Whisler, President; Henry Roads, Vice-President; L. T. Van Cleave, Secretary; E. S. Walton, Treasurer; W. H. Jones, Manager.—*See Projected Tinplate and Terne Plate Works.*

Central Steel Company, Indianapolis, Marion county. Built in 1887; one double and 2 single heating furnaces and one 26-inch beam mill; product, beams from 6 to 20 inches; daily capacity, 100 tons. Fuel, producer gas and coal. Address Major Collins, President, Brazil, Indiana. (Formerly leased by the Indiana Steel Company.)—*Idle and for sale or lease.*

Central Works, Republic Iron and Steel Company, Chicago. Works at Brazil, Indiana.—*For description see page 85.*

Chicago Horse Shoe Works, John J. McCook, 120 Broadway, New York. Works at East Chicago, Lake county, Indiana. Built in 1888–9; one large and 8 small heating furnaces, 7 bending machines, 7 planishing machines, 2 grubbing machines, 18 punching machines, and one train of 9-inch rolls; product, horseshoe bars and horse and mule shoes; annual capacity, single turn, 10,000 tons. Fuel, petroleum and coal.—*Idle.*

Chicago Steel Manufacturing Company, New Castle, Henry county. Works originally built at Hammond, Lake county, Indiana, in 1886–7; almost entirely destroyed by fire in December, 1903; commenced rebuilding at New Castle, May 1, 1904; may be ready for operation in July, 1904; when completed the works will be equipped with 4 gas heating furnaces, 2 trains of rolls, (one 22-inch hot and one 22-inch cold,) and 102 cut-nail machines;

product, shovel and nail plate, iron and steel cut nails, pressed steel specialties, and shovels, spades, and scoops; annual capacity, 300,000 kegs of cut nails and 18,000 tons of rolled products. Fuel, natural gas. Brand, "Lake Side." Charles G. Hutchinson, President; Frank M. Baldwin, First Vice-President and Treasurer; Austin F. Cabel, Second Vice-President; L. Hugh O'Donnell, Secretary and General Manager; Tom Boyll, Superintendent. Sales made by the company. (The works at Hammond were formerly equipped with two 5-gross-ton Bessemer steel converters which were dismantled in 1902.)

Elwood Plant, Ames Shovel and Tool Company, Boston, Mass. Works at Elwood, Madison county. 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 abandoned rolling mill at Greenfield, Indiana; first rolled materials produced in February, 1899; present plant contains 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. Hobart Ames, President; W. J. Alford, Vice-President; W. H. Ames, Secretary; Oliver W. Mink, Treasurer; C. H. Myers, General Manager; Thomas E. Palmer, Manager of Elwood Plant. (Formerly operated by the Wright Shovel Company; later by the Elwood Steel Company.) —*See The H. M. Myers Company, page 261.*

Emlyn Iron Works, The Equitable Trust Company, Receiver, 152 Monroe st., Chicago. Works at East Chicago, Lake county, Indiana. Built in 1900 and first put in operation in July, 1900; 7 double and 6 single puddling furnaces, one piling furnace, 5 heating furnaces, and 4 trains of rolls (8, 9, 16, and 18-inch); product, bar iron and steel; annual capacity, 40,000 tons. Fuel, coal. George M. Bard, President; George F. Davie, Vice-President and Treasurer; George R. Stewart, Secretary; Charles G. Bard, Superintendent.—*Receiver appointed in June, 1904.*

Fort Wayne Iron and Steel Company, Fort Wayne, Allen county. Built in 1903, utilizing machinery formerly in the plant of the American Rolling Mill Corporation, at Muskegon, Michigan; first put in operation December 23, 1903; one single and 3 double puddling furnaces, 4 gas heating furnaces, one gas piling furnace, and 3 trains of rolls (one 20-inch muck, one 18-inch bar, and one 9-inch guide); product, bar and band iron, $\frac{5}{16}$ of an inch to 4-inch rounds and squares, $\frac{3}{8}$ of an inch by No. 14 to 10-inch by $1\frac{1}{2}$-inch flats; also ovals, wagon box iron, etc.; annual capacity, 50,000 tons. Brand, "Wayne Special." Fuel, bituminous coal. Edward F. Yarnelle, President; Charles H. Raw-

lins, Vice-President, General Manager, and General Sales Agent; Howell C. Rockhill, Secretary; John W. Sale, Treasurer; George H. Lowe, Superintendent. Chicago sales office, 407 The Temple; P. H. Joyce, Sales Agent.

Gould Steel Company, No. 1 West Thirty-fourth street, New York. Works at Anderson, Madison county, Indiana. Built in 1891–2 and first put in operation March 28, 1892; 2 acid open-hearth steel furnaces (one 12 and one 15-gross-ton); product, steel castings; annual capacity, 9,000 tons. Fuel, natural gas. Brand, "G. A." Charles A. Gould, President; Charles M. Gould, Vice-President; William E. Kurtz, Secretary and General Manager; William S. Gould, Treasurer.

Highland (The) Iron and Steel Company, Terre Haute, Vigo county. Built in 1901 and first put in operation November 25, 1901; 7 double puddling furnaces, 4 single scrap furnaces, 4 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, 40,000 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, New York. Building works at Indiana Harbor, Indiana.—*See pages 95–6.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana.—*For description see page 163.*

Indiana Rolling Mill Company, New Castle, Henry county. 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 80,000 to 100,000 tons. Fuel, natural gas. A department for the manufacture of shovels is connected with the works. C. W. Mouch, President and Manager; E. N. Bundy, Vice-President; C. S. Hernley, Secretary; D. W. Kinsey, Treasurer.

Indiana Works, Republic Iron and Steel Company, Chicago. Works at Muncie, Indiana.—*For description see page 86.*

Inland Works, Republic Iron and Steel Company, Chicago. Works at East Chicago, Indiana.—*For description see page 86.*

Irondale Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Middletown, Ind.—*See pages 56–7.*

Juniata Steel and Iron Company, Greencastle, Putnam county. Built in 1902–3 and first put in operation April 20, 1903; 6 sheet and pair furnaces, one annealing furnace, 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; annual capacity, 18,000 tons. Also makes tin and terne plates. Fuel, coal. Brand, "Juniata." R. L. O'Hair, President; J. W. Lovett, Vice-President; F. M. Lyon, Secretary; The Central Trust Company, of Greencastle, Indiana, Treasurer; William J. Richards, Superintendent.—*See Tinplate and Terne Plate Works.*

Kokomo Steel and Wire Company, Kokomo, Howard county. 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; Albert A. Conradt, Vice-President; J. E. Fredrick, Secretary; G. W. Charles, Treasurer; Thomas Harris, Superintendent.

Marion Works, Republic Iron and Steel Company, Chicago. Works at Marion, Indiana.—*Not in operation. See page 86.*

Matthews Steel Casting Company, Octave Jacqman, Receiver, Matthews, Grant county. Built in 1902–3 and first steel made March 7, 1903; one 10-gross-ton Siemens acid open-hearth steel furnace; product, machinery castings; annual capacity, 3,000 tons. Fuel, natural gas. Ora Lechoin, President; George Catterson, Vice-President and Manager; Fremont Wilson, Secretary and Treasurer.—*Idle and for sale.*

Midland Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Muncie, Indiana.—*For description see page 57.*

Morewood Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Gas City, Indiana.—*See page 58.*

Muncie Works, American Rolling Mill Corporation, 727 Rookery Building, Chicago. Works at Muncie, Delaware county, Indiana. 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 bushelling furnaces, one single and one double puddling furnace, 4 heating furnaces, and 3 trains of rolls (one 7, one 10 with auxiliary roughing trains, and one 18-inch 2-high muck); product, bar and band iron and steel; annual capacity, 27,000 tons. Fuel, natural gas and bituminous coal. Two natural gas wells are owned by the corporation. Lewis C. Straight, President, Monadnock Building, and Ferd. W. Peck, Jr., Secretary and Treasurer, and W. I. Moody, General Manager, Rookery Building, Chicago; A. W. Tyler, Superintendent, Muncie. (Formerly called the Muncie Rolling Mill and operated by the American Rolling Mill Company.)

Muncie Works, Republic Iron and Steel Company, Chicago. Works at Muncie, Indiana.—*For description see pages 86–7.*

National Car Coupler Company, 525 Monadnock Block, Chicago. Works at Converse, Miami county, Indiana. One 12-gross-ton acid open-hearth steel furnace, built in 1898; product, freight and passenger car couplers, steel platforms, platform buffers, Hinson friction draft gears, etc.; annual capacity, 7,500 tons. Fuel, natural gas. J. A. Hinson, President; W. D. Hurford, Secretary and Treasurer; J. W. Harrison, Superintendent; S. W. Midgley, Sales Agent.

National Rolling Mill Company, Vincennes, Knox county. Originally built at Hartford City, Blackford county, Indiana, in 1901 and first put in operation September 30, 1901; removed to Vincennes in 1903–4 and put in operation February 15, 1904; 4 scrapping furnaces, 2 Smith heating furnaces, and 2 trains of rolls (one 18-inch muck and one 10-inch finishing); product, scrap bar and finished bar iron; annual capacity, 20,000 tons of scrap bars and 20,000 tons of finished bars. Fuel, bituminous coal. One 8-inch train of rolls may be added. E. B. Mitchell, President; H. B. Smith, Vice-President; J. H. Jones, Secretary and Treasurer ; S. N. Bradshaw, General Manager and Selling Agent.

National Steel Casting Company, Montpelier, Blackford county. 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 Hofmann, President, D. F. Bash, Secretary, and F. E. W. Scheimann, Treasurer, Fort Wayne ; James O'Donnell, Vice-President, and T. C. Neal, Manager, Montpelier.

Ohio Falls Iron Company, New Albany, Floyd county. 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, light rails and bar iron for bridge works, car works, and railroads; specialty, wide flats up to 12 inches; annual capacity, 50,000 tons. Fuel, coal. Brand, "Ohio Falls." George M. Clark, President; Henry Green, Vice-President and Superintendent.

Oliver Chilled Plow Works, South Bend, St. Joseph county. Crucible steel plant built in 1891 for the production of steel solely for use in the works in the manufacture of plows; 96 pots can

be used at each heat; annual capacity, 100 tons. Fuel, coke. James Oliver, President; George Ford, Secretary; J. D. Oliver, Treasurer and General Manager.

Peru Steel Casting Company, Peru, Miami county. Built in 1899 and first steel made in 1900; two 20-gross-ton basic open-hearth steel furnaces; product, castings for machine and railroad work from 100 to 75,000 pounds; annual capacity, 14,000 tons. Fuel, oil. Philip Matter, President and Treasurer; Charles A. Eastman, General Manager; C. B. Hershey, Superintendent.

Terre Haute Works, Republic Iron and Steel Company, Chicago. Works at Terre Haute, Indiana.—*For description see page 87.*

Wabash Works, Republic Iron and Steel Company, Chicago. Works at Terre Haute, Indiana.—*For description see page 88.*

Westerman Works, Republic Iron and Steel Company, Chicago. Works at Marion, Indiana.—*Not in operation.* *See page 88.*

Wetherald Works, Republic Iron and Steel Company, Chicago. Works at Frankton, Indiana.—*Not in operation.* *See page 88.*

Whiteley Steel Company, Muncie, Delaware county. Contracting and sales department, Klopfer Block, Muncie. This company controls the sale of McHaffie or Whiteley's crown steel, which is manufactured for it at Muncie by the Whiteley Malleable Castings Company; the works at Muncie were built in 1891–3 and McHaffie castings were first made in 1893; one 5-gross-ton furnace; product, McHaffie crown steel castings; annual capacity, 2,250 tons. Fuel, bituminous coal. Officers of the Whiteley Steel Company: William G. Wagner, President; Burt H. Whiteley, Vice-President and Manager; Amos Whiteley, Secretary; Elmer J. Whiteley, Treasurer.

PROJECTED ROLLING MILL.

Ward-Dickey Steel Company, Indiana Harbor, Lake county. 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. 14 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: 36 completed, 3 building, and one projected. Of these 6 make open-hearth steel and one open-hearth steel plant is being built, one makes crucible steel, and one makes McHaffie steel.

There are no blast furnaces in Indiana.

ILLINOIS.

COKE FURNACES—22.

Iroquois Iron Company, South Chicago. Furnaces at 95th st. and Calumet river. Two stacks: Furnace A, 80 x 17½, built in 1890–1 and blown in September 21, 1891; four Cowper-Kennedy stoves. Furnace B, 85 x 18½, built in 1900–1 and blown in January 27, 1902; four Kennedy central combustion chamber stoves. Fuel coke; ore, Lake Superior; 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; William A. Rogers, Vice-President; George A. Tripp, Secretary and Treasurer; Samuel A. Kennedy, General Superintendent. Selling agents, Rogers, Brown & Co., Chicago and branch houses.—*Active in 1903.*

Joliet Works, The Illinois Steel Company, Chicago. Furnaces at Joliet. Four stacks; fuel, coke.—*For description see page 27.*

North Works, The Illinois Steel Company, Chicago. Furnaces at the foot of Wabansia ave., on the north branch of the Chicago river. Two stacks; fuel, coke.—*For description see page 27.*

South Chicago Furnaces, South Chicago Furnace Company, Chicago. Furnaces at South Chicago. Two stacks; fuel, coke. (All the stock of the South Chicago Furnace Company is owned by the International Harvester Company.)—*See pages 159–60.*

South Works, The Illinois Steel Company, Chicago. Furnaces at South Chicago. Ten stacks; fuel, coke.—*See pages 27–8.*

Union Works, The Illinois Steel Company, Chicago. Furnaces at Chicago. Two stacks; fuel, coke.—*For description see page 28.*

Number of coke furnaces in Illinois: 22 stacks. No charcoal stacks.

ROLLING MILLS AND STEEL WORKS—30 COMPLETED AND 1 PROJECTED.

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, New Jersey. Works at Chicago Heights, Illinois. —*For description see page 162.*

Chicago Heights Works, Inland Steel Company, Chicago. Works at Chicago Heights.—*For description see page 163.*

Chicago Malleable Castings Company, One Hundred and Twentieth street and Centre ave., Chicago. Works at West Pullman, Cook county. Built in 1899 and first steel made in October, 1901; one 10-gross-ton Siemens basic open-hearth furnace; product, gears, pinions, and small steel castings; annual capacity, 1,000 tons. Fuel, coal. A plant for the manufacture of malleable iron cast-

ings is connected with the works. W. H. Jones, President; S. J. Llewellyn, Vice-President; E. H. Llewellyn, Secretary; John T. Llewellyn, Treasurer and General Manager.

Chicago Splice Bar Mill, The Sellers Manufacturing Company, Chicago. Office and works, Chicago ave. and the Chicago river. Built in 1878; one forge fire, 3 heating furnaces, and one 15-inch train of rolls; product, all kinds of splice bars, including "Samson" bars; annual capacity, 20,000 tons. Fuel, coal. A punching and shearing department is connected with the works. Morris Sellers, President; John M. Sellers, Vice-President and General Manager; P. J. Geraghty, Secretary and Treasurer; David H. Lentz, Superintendent; Thomas Moore, Purchasing Agent.

Commonwealth Steel Company, Bank of Commerce Building, St. Louis, Missouri. Works at Granite City, Madison county, Illinois. Built in 1902; 4 open-hearth steel furnaces (one 25-gross-ton acid and three 25-gross-ton basic); first basic steel made September 8, 1902, and first acid steel made July 20, 1903; product, steel castings exclusively; annual capacity, 20,000 tons of acid castings and 50,000 tons of basic castings. Fuel, oil. One 25-gross-ton basic furnace is projected. Thomas K. Niedringhaus, President; William F. Niedringhaus, Vice-President; J. S. Andrews, Second Vice-President; Louis J. Hayward, Treasurer; O. S. Pulliam, General Manager; C. T. Westlake, Works Manager.

Deering Mills, (Deering Division,) International Harvester Company, Chicago. Works at Chicago.—*For description see page 160.*

Dillon-Griswold Wire Company, Sterling, Whiteside county. 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. C. M. Wicker, President; Sanborn G. Tenney, Vice-President; Chester Griswold, Treasurer; Robert McCosh, Secretary and Assistant Treasurer; H. C. Wicker, General Manager.—*Rod mill idle.*

East St. Louis Works, American Steel Foundries, New York. Works at East St. Louis, Illinois.—*For description see page 95.*

Grand Crossing Tack Company, Grand Crossing, Cook county. Sales offices, San Francisco, California; City of Mexico, Mexico; Buenos Ayres, Argentine Republic; Rio de Janeiro, Brazil; and

Glasgow, Scotland. 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, 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, bituminous 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, 1¾-inch square billets for the use of the company only; annual capacity, 45,000 tons; fuel, manufactured gas. O. N. Hutchinson, President, Treasurer, and Manager; E. W. Hutchinson, Secretary and Superintendent.

Granite City Rolling Mills, National Enameling and Stamping Company, New York. Works at Granite City, Ill.—*See page 169.*

Granite City Works, American Steel Foundries, New York. Works at Granite City, Illinois.—*For description see page 95.*

Hartmann, Hay & Reis, Belleville, St. Clair county. 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. E. E. Wangelin, Manager.

Joliet Plant, American McKenna Process Company, Colby and Abbot Building, Milwaukee, Wisconsin. Works at Joliet, Will county, 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.—*See Tremley Point Plant, page 211.*

Joliet Works, The Illinois Steel Company, Chicago. Works at Joliet. —*For description see pages 28–9.*

Joliet Works, Phoenix Horse Shoe Company, Rookery Building, Chicago. Works at Joliet, Will county. Built in 1893 and put in operation in the same year; 2 gas regenerative furnaces, 18 heating furnaces, and 4 trains of rolls (three 9-inch and one 3-high

20-inch); specialty, horse and mule shoes; annual capacity, 18,000 tons. Fuel, coal and manufactured gas. Brand, "Phoenix." Elisha H. Miller, President, A. E. Nusbaum, Treasurer, and S. H. Roberts, Secretary, Chicago; Thomas F. Hotchkiss, Purchasing Agent, Joliet.—*See Poughkeepsie Works, page 203.*

Madison Plant, Helmbacher Forge and Rolling Mills Company, Lincoln Trust Building, St. Louis, Missouri. Works at Madison, Madison county, 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 Mill Company and put in operation October 15, 1902; 5 cinder bottom scrap furnaces, 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, 40,000 tons. Fuel, bituminous coal. A machine shop is connected with the works. W. J. McBride, President, S. C. Leonard, Vice-President and General Manager, D. A. Bixby, Secretary, S. S. DeLano, Treasurer, and J. M. Buick, Auditor, Lincoln Trust Building, St. Louis, Mo.; J. D. Leonard, Superintendent, Madison, Illinois.—*See Helmbacher Plant, page 351.*

Melrose Park Works, Latrobe Steel and Coupler Company; main office, 1200 Girard Building, Philadelphia. Chicago office, 1720 Old Colony Building; New York office, No. 11 Broadway, room 1506. Works at Melrose Park, Cook county, Illinois. Open-hearth steel department built in 1884–5 and first steel made in February, 1885; plant now contains two 30-gross-ton acid furnaces with an annual capacity of 35,000 tons; product, steel castings and automatic steel car couplers. Fuel, coal. Marriott C. Smyth, President; C. C. Warren, Secretary; W. W. Turlay, Treasurer; G. Aertsen, General Manager; W. L. Jacoby, Superintendent.

Pullman (The) Company, Pullman, Cook county. Chicago office, Pullman Building. Built in 1883–4; 2 forge fires, 3 gas heating furnaces, 2 coal heating furnaces, and 3 trains of rolls (8-inch, 10-inch, and 18-inch); product, car and merchant iron and steel and special shapes of iron and steel; annual capacity, 32,000 tons of bar iron and 12,000 tons of muck bar. Fuel, coal and manufactured gas. Robert T. Lincoln, President, T. H. Wickes, Vice-President, George F. Brown, General Manager, and W. A. Hughes, Purchasing Agent, Chicago.

St. Louis Steam Forge and Iron Works, East St. Louis, St. Clair county. Built in 1902–3, utilizing in part the machinery from the dismantled plant of the company at St. Louis, Missouri; first rolled products made June 22, 1903; 9 reverberatory heating fur-

naces, 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. The erection of one 15-gross-ton acid and two 50-gross-ton basic open-hearth steel furnaces is contemplated; product, ingots, small castings, and billets. G. C. McDonald, President; Annabelle McD.-Heckel, Vice-President; C. L. McDonald, Secretary, Treasurer, and Manager.

Sandwich Iron and Steel Company, (not incorporated,) B. Manfield, proprietor, Sandwich, De Kalb county. Built in 1900 and first put in operation in October, 1900; 2 scrap heating furnaces and 2 trains of rolls (one 18-inch muck and one 9-inch guide); product, bar iron; annual capacity, 18,000 tons of finished bars. Fuel, bituminous coal.—*Idle and for sale or lease.*

South Chicago Works, International Harvester Company, Chicago. Works at South Chicago.—*For description see page 160.*

South Works, The Illinois Steel Company, Chicago. Works at South Chicago.—*For description see page 29.*

Springfield Works, Republic Iron and Steel Company, Chicago. Works at Springfield.—*For description see page 87.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Worcester county, Massachusetts. Sales offices, Fitchburg, Massachusetts; 85 First street, Portland, Oregon; 119 Jackson street, Seattle, Washington; 40 Murray street, New York. Works at Western avenue, Sixteenth and Seventeenth streets, Chicago. Built in 1900 and first put in operation in December, 1900; 4 heating furnaces, 2 trains of rolls, (one 18-inch and one 24-inch,) and one 6,000-lb. hammer; one 36-pot crucible steel-melting furnace with 6 holes; first crucible steel made December 17, 1900; annual capacity, 3,000 tons of ingots; product, saw plate and crucible sheet steel; annual capacity, 2,000 tons of rolled products. Fuel, bituminous coal and coke. Daniel Simonds, President, and H. F. Coggshall, Treasurer, Fitchburg, Mass.; W. G. Merriman, General Manager of Rolling Mill and Steel Plant, Chicago.

Sylvan Works, Republic Iron and Steel Company, Chicago. Works at Moline.—*For description see page 87.*

Tudor Works, Republic Iron and Steel Company, Chicago. Works at East St. Louis.—*For description see page 87.*

Waukegan Works, American Steel and Wire Company of New Jersey, Chicago. Works at Waukegan.—*For description see page 46.*

Wells and French Works, American Car and Foundry Company, St. Louis, Mo. Works at Chicago.—*For description see page 165.*

Western Tube Company, Kewanee, Henry county. 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 two 5,000-pound hammers; product, skelp iron, used by the company in the manufacture of wrought iron and steel pipe; annual capacity, 75,000 tons. Fuel, coal and manufactured gas. The company also manufactures malleable and cast-iron fittings, brass and iron valves, and similar products. A. M. Hewlett, President; C. E. McCullough, Secretary and Treasurer; John Duncan, General Manager of Sales.

PROJECTED ROLLING MILLS—1.

Aermotor Company, Twelfth and Rockwell sts., Chicago. Contemplates adding to a plant now equipped for the manufacture of butt-welded pipe at Chicago Heights 6 stands of continuous hot rolls for the manufacture of skelp, angles, flats, and rounds. A galvanizing plant is connected with the works. La Verne W. Noyes, President and Manager; Fred E. Smith, Vice-President; P. Bird Price, Secretary and Treasurer.

Number of rolling mills and steel works in Illinois: 30 completed and one projected. Of these 3 make Bessemer steel, one makes Tropenas steel, 8 make open-hearth steel, 2 open-hearth steel plants are projected, and 2 make crucible steel.

MICHIGAN.

COKE FURNACES—1.

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 20 x 83; fuel, by-product coke made by the Semet-Solvay process; ore, Lake Superior; product, Bessemer, foundry, basic, and malleable pig iron; annual capacity, from 90,000 to 100,000 tons. Brand, "Zug" and "Zug Special." D. R. Hanna, President; C. C. Bolton, Vice-President; Charles W. Baird, Secretary and Treasurer; F. B. Richards, General Manager. Sole sales agents, M. A. Hanna & Co., Cleveland.—*First blown in in 1904.*

Number of coke furnaces in Michigan: one stack.

CHARCOAL FURNACES—10 COMPLETED AND 1 BUILDING.

Antrim Iron Company, Mancelona, Antrim county. General office, 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, "An-

trim." Connected with the furnace are 76 charcoal kilns with an annual capacity of 3,250,000 bushels. T. J. O'Brien, President, and J. C. Holt, Secretary and Treasurer, Grand Rapids; N. M. Langdon, Manager, Mancelona. Selling agent, the Superior Charcoal Iron Company, Grand Rapids, Michigan.—*Active in 1903.*

Boyne City Charcoal Iron Company, Marquette, Marquette county. Commenced building in 1903 at Boyne City, Charlevoix county, utilizing machinery from the abandoned Martel Furnace at St. Ignace, Michigan; one charcoal stack, to be 60 x 10½, and to be equipped with two Kloman fire-brick stoves, each 60 x 15½; ores, Lake Superior from the Marquette and Menominee districts; product, car-wheel and malleable pig iron; estimated annual capacity, 29,000 tons. Charles H. Schaffer, President, Frank B. Baird, Vice-President, and Noah W. Gray, Secretary and Treasurer, Marquette; Fred Smith, Manager, Boyne City.—*Building. Will probably be ready for blast in September, 1904.*

Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim county. One stack, 64 x 11, first put in blast in July, 1873; rebuilt in 1902; hot blast; 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." Chemical works for the manufacture of wood alcohol and acetate of lime are connected with 51 charcoal kilns operated by the company. Lincoln Brown, President, Chicago; E. G. Rust, Vice-President and General Manager, Kellogg Fairbank, Secretary, and C. D. Towne, Treasurer, Elk Rapids. Selling agent, the Superior Charcoal Iron Company, Grand Rapids, Michigan.—*Active in 1903.*

Fruitport Furnace, The Spring Lake Iron Company, Fruitport, Muskegon county. 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 1903.*

Manistique Iron Company, Manistique, Schoolcraft county. 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; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 36,000 tons. Brand, "Champion." Chemical works for the recovery of by-products are connected with 74 charcoal kilns operated by the company. Joseph H. Berry, President, W. G. Smith, Vice-President, E. H. Flinn, Secretary and Treasurer, Detroit; W. H. Nelson, Manager, Manistique. Selling agent, the Superior Charcoal Iron Company, Grand Rapids.—*Active in 1903.*

Michigan Iron Company, Limited, Leib and Wight streets, Detroit. Furnace at Newberry, Luce county, Michigan. 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; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 29,000 tons. Brand, "Michigan." Connected with the furnace are 52 charcoal kilns with a capacity of 90 cords each. Joseph H. Berry, Chairman, W. G. Sharp, Vice-Chairman, W. G. Smith, Treasurer, and John Christian, Secretary, Detroit; E. E. Johnston, Manager, Newberry. Selling agent, the Superior Charcoal Iron Company, Grand Rapids.—*Active in 1903.*

Peninsular Furnace, The Peninsular Iron Manufacturing Company, Limited, lessee, Detroit. One stack, 42 x 9½, built in 1863 and put in blast in February, 1864; warm blast; open top, covered by a plate when not filling; ore, Lake Superior exclusively; product, car-wheel iron, iron for special purposes, and iron for malleable castings; annual capacity, 10,000 tons. Brand, "Peninsular." Joseph H. Berry, Chairman; F. L. Smith, Vice-Chairman; Solon Burt, Secretary; W. G. Smith, Treasurer. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly operated by the Peninsular Iron Company; owned by Fred L. Smith, Trustee.)—*Active in 1903.*

Pioneer Furnace, The Cleveland-Cliffs Iron Company, Mercantile Bank Building, Cleveland, Ohio. Furnace at Gladstone, Delta county, Michigan. One stack, 60 x 12, built in 1895–6 and blown in April 16, 1896; two hot-blast stoves; ores, Lake Superior red 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." Connected with the furnace are 70 charcoal kilns with an annual capacity of 2,705,000 bushels. William G. Mather, President and Treasurer, J. H. Sheadle, Secretary, and R. C. Mann, Auditor, Mercantile Bank Building, Cleveland, Ohio; Austin Farrell, Manager, Gladstone. Selling agent, the Superior Charcoal Iron Company, Grand Rapids.—*Active in 1903.*

Pioneer Iron Company, Mercantile Bank Building, Cleveland, Ohio. Two furnaces at Marquette, Marquette county, Michigan: Carp Furnace, 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; brand, "Excelsior." Pioneer Furnace No. 2, one stack, 70 x 12, built in 1901–3 and first put in operation April 16, 1903; three hot-blast stoves; brand, "Marquette." Ore, Lake

Superior; product, car-wheel, malleable, foundry, and low-phosphorus pig iron; total annual capacity, 60,000 tons. Noah W. Gray, Manager Carp Furnace, and Austin Farrell, Superintendent Pioneer Furnace No. 2, Marquette. Charcoal kilns with an annual capacity of 5,373,000 bushels are connected with the furnaces. George A. Garretson, President, William G. Mather, Vice-President, Fred. A. Morse, Treasurer, and E. V. Hale, Secretary, Cleveland, Ohio. Selling agent, the Superior Charcoal Iron Company, Grand Rapids.—*Active in 1903.*

Wayne Furnace, Wayne Iron Company, Limited, lessee, Detroit. One stack, 62 x 10⅝, 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; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 20,000 tons. Brand, "Crescent." Joseph H. Berry, Chairman; W. G. Sharp, Vice-Chairman; John Christian, Secretary; W. G. Smith, Treasurer; Solon Burt, Manager. Selling agent, the Superior Charcoal Iron Company, Grand Rapids. (Formerly operated by the Detroit Iron Furnace Company; furnace now owned by the Wayne Iron Company, Limited; real estate owned by the Detroit Iron Furnace Company.)—*Active in 1903.*

Number of charcoal furnaces in Michigan: 10 completed stacks and one stack building.

Total number of furnaces in Michigan: 11 completed stacks and one stack building. Of these one stack uses coke for fuel, 10 stacks use charcoal, and one charcoal stack is being built.

ROLLING MILLS AND STEEL WORKS—5 COMPLETED AND 1 PROJECTED.

Detroit (The) Steel Casting Company, Detroit. Built in 1889; two 1½-gross-ton Robert-Bessemer steel converters; first blow made July 11, 1889; product, steel castings; annual capacity, 5,000 tons. Fuel, coal. T. H. Newberry, President; John S. Newberry, Vice-President and General Manager; Thomas F. Meek, Secretary; Fred P. Smith, Treasurer. (Formerly a part of the Detroit Steel and Spring Works and operated by the Detroit Steel and Spring Company.)

Detroit Works, Railway Steel-Spring Company, New York. Works at Detroit, Michigan.—*For description see pages 157–58.*

Harrow Spring Company, Kalamazoo, Kalamazoo county. 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 soft merchant bars; annual capacity, 16,000 tons. Fuel, bi-

tuminous coal. A plant for the manufacture of car springs and agricultural implement springs is connected with the works. J. K. Wagner, President; E. R. Burdick, Secretary; W. P. Burdick, Treasurer and General Manager.

Michigan-Peninsular Works, American Car and Foundry Company, St. Louis, Missouri. Works at Detroit, Mich.—*See page 164.*

Seamless (The) Steel Tubes Company, 804 Union Trust Building, Detroit, Wayne county. Works at 833 River street, Detroit. Built in 1900 and first put in operation January 1, 1901; 3 heating furnaces, one piercing machine, and 3 trains of rolls; product, rolled blanks, all consumed by the company in the manufacture of seamless-drawn open-hearth steel marine, locomotive, and merchant boiler tubes, automobile tubes, arch pipes, stay tubes, safe ends, mechanical tubes, and upset and swelled tubes; annual capacity, 3,000 tons of blanks and 3,000 tons of tubes 3½ inches in diameter and smaller. Fuel, bituminous coal and crude oil. W. C. McMillan, President; T. H. Simpson, Vice-President; George M. Black, Secretary and Treasurer; R. H. Phillips, Assistant Secretary; C. H. Wood, Manager.

PROJECTED STEEL-CASTING PLANTS—1.

Michigan Steel Casting Company, 1120 Chamber of Commerce, Detroit. Contemplates erecting at Delray, Wayne county, four 25-gross-ton acid open-hearth steel furnaces for making ship, bridge, and other castings. Karl R. Davies, President; Max R. Davies, Vice-President; Fred J. McMurtrie, Secretary and Treasurer.

Number of rolling mills and steel works in Michigan: 5 completed and one projected. Of these one makes Robert-Bessemer steel and one open-hearth steel plant is projected.

WISCONSIN.

COKE FURNACES—5.

Mayville Furnace, The Northwestern Iron Company, Pabst Building, Milwaukee. Furnace at Mayville, Dodge county. One stack, 77 x 17, 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; fuel, Connellsville coke; ores, Menominee, Marquette, Gogebic, and local; product, Bessemer and foundry pig iron; annual capacity, 65,000 tons. Brands, "Sidney" and "Gertrude." Irving M. Bean, President and Treasurer, and James C. Spencer, Vice-President, Milwaukee; W. K. Packman, Secretary and Superintendent, Mayville. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

Milwaukee Works: Bay View Furnaces, The Illinois Steel Company, Chicago. Furnaces at Milwaukee, Wisconsin. Two stacks; fuel, coke.—*For description see page 27.*

Spring Valley Furnace, Spring Valley Iron and Ore Company, Frederick H. Foote, proprietor, Rookery Building, Chicago. Furnace at Spring Valley, Pierce county. One stack, 65 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; two 60-pipe Pollock stoves; ore, brown hematite, mined 1½ miles from the furnace; 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. May add three fire-brick stoves in 1904. H. B. Feidler, Superintendent, Spring Valley. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1903.*

Thomas Furnace, The Thomas Furnace Company, Milwaukee. One stack, 75 x 16, 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 18 x 60, and two Massicks & Crooke stoves, 18 x 75; fuel, Connellsville coke; ore, Lake Superior; product, foundry, malleable Bessemer, and standard Bessemer pig iron; annual capacity, 75,000 tons. Brand, "Thomas." John M. Thomas, President and Manager, Milwaukee; T. E. Thomas, Vice-President, and W. Aubrey Thomas, Secretary, Niles, Ohio. Sales made by the company. (Formerly called Minerva Furnace.)—*Active in 1903.*

Number of coke furnaces in Wisconsin: 5 stacks.

CHARCOAL FURNACES—1.

Hinkle Furnace, Ashland Iron and Steel Company, Ashland, Ashland county. 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; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 45,000 tons. Brand, "Hinkle." Connected with the furnace are 64 Hottentot kilns for the manufacture of charcoal; also a plant for the manufacture of charcoal by-products; also a machine shop. The company also operates the "Yale" iron-ore mine at Bessemer, Michigan. Joseph H. Berry, President, and William G. Smith, Secretary and Treasurer, Detroit, Michigan; W. H. Hinkle, Vice-President, and William Wilkins, Manager, Ashland, Wisconsin. Selling agents, Rogers, Brown & Co., Cincinnati.—*Active in 1903.*

Number of charcoal furnaces in Wisconsin: one stack.

Total: 6 stacks. Of these 5 stacks use coke and one uses charcoal.

ROLLING MILLS AND STEEL WORKS—14.

Bay View 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; one 1-gross-ton acid open-hearth steel furnace built in 1897; first open-hearth steel made October 15, 1897; 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. (Formerly operated by the Shaw Steel Casting Company.)

Clinton (The) Burnham Foundry Company, 705-23 Park street, Milwaukee. Built in 1902; 6 crucible steel-melting furnaces with 18 holes and 36 pots; first steel made in February, 1903; product, crucible steel machinery castings; annual capacity, 1,200 tons. Fuel, oil. C. M. Towne, President; T. J. Durnin, Secretary and Treasurer.

Crucible Steel Casting Company, 612 Clinton st., Milwaukee. Six 3-hole crucible steel-melting furnaces; first steel made in December, 1898; 12 pots can be used at a heat; product, machinery castings of all kinds; annual capacity, 1,200 tons. Fuel, oil. F. A. Lange, President and Manager.

Dutcher (The J. A. and P. E.) Company, Milwaukee. Four 4-pot Noble liquid-fuel crucible steel-melting furnaces built in 1889 and first steel made in that year; one 3-gross-ton Wellman rotary acid open-hearth steel furnace built and put in operation in 1895; product, chiefly bicycle, machinery, and electrical castings; annual capacity, 900 tons of open-hearth and 75 tons of crucible castings. Fuel, oil. A. E. Dutcher, President; F. B. Dutcher, Vice-President; H. B. Goodrich, Secretary and Treasurer.

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; 2 forge fires, 8 heating furnaces, 3 trains of rolls, (one 9, one 10, and one 16-inch,) and 4 horseshoe machines; product, horseshoes, mule shoes, and bar iron; annual capacity, 20,000 tons of bar iron and 120,000 kegs of horseshoes. Fuel, coal and oil. Brand, "Eagle Horse Shoes." George B. Van Norman, President; Howard Green, Vice-President; James McAlpine, Treasurer; L. A. McElroy, Secretary and General Manager.

Falk (The) Company, Milwaukee. One 15-gross-ton Wellman-Seaver acid open-hearth steel furnace built in 1900 and first steel made April 7, 1900; product, all kinds of open-hearth steel castings; annual capacity, 8,000 tons. Fuel, oil. A 20-gross-ton basic open-hearth steel furnace may be added. Herman W. Falk, President;

Otto H. Falk, Vice-President; Adolph Quentin, Second Vice-President; E. A. Wurster, Secretary and Treasurer; Charles L. Jones, Assistant Secretary.

Milwaukee Steel Foundry Company, South Water and Virginia sts., Milwaukee. One 1-gross-ton special steel converter built in 1903–4; first steel made March 15, 1904; product, steel castings from ½ of a pound to 500 pounds; specialties, electrical steel, tool steel, manganese steel, and machinery steel; annual capacity, 2,000 tons. Fuel, coke. J. G. Shaw, President and Manager; W. T. Maynard, Secretary; C. F. Maynard, Treasurer.

Milwaukee Works, The Illinois Steel Company, Chicago. Works at Milwaukee, Wisconsin.—*For description see page 29.*

National Electric Company, (successor to Christensen Engineering Company,) Milwaukee. Built in 1899–1900; 6 crucible steel-melting furnaces with 12 steel-melting holes; number of crucible pots, 24; first crucible steel made in May, 1900; product, steel castings; specialties, crank shafts, magnet frames, pole pieces, and general machinery castings; annual capacity, 800 tons. Fuel, oil. A plant for the manufacture of air brakes and electrical machinery is connected with the works. S. W. Watkins, President; F. C. Randall, Vice-President and Manager; R. P. Tell, Secretary and Treasurer; Stephen Wright, Foundry Superintendent.

Nortmann-Duffke Foundry Company, 26th avenue, Layton Park, Milwaukee. Built in 1902; 4 crucible steel-melting furnaces with 24 holes; total number of pots, 24; first crucible steel made in October, 1902; product, crucible steel castings; annual capacity, 1,300 tons. Fuel, oil. A gray iron foundry for the manufacture of all kinds of machinery castings is connected with the works; daily capacity, 15 tons. Val Nortmann, President; Louis Duffke, Secretary, Treasurer, and Manager. Selling agent, F. T. Radecke, Chicago.

Smith (George H.) Steel Casting Company, Milwaukee. Chicago office, 40 Dearborn st. Built in 1897; two 2-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; product, steel castings; annual capacity, 3,000 tons. Six 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, Wagner and Marshall Company, 40 Dearborn st., Chicago.

Tobin-Gerlinger Steel Casting Company, West Allis, Milwaukee county. Built in 1902–3; 3 crucible steel-melting furnaces; number of pots, 12; first crucible steel made January 12, 1903; prod-

uct, all kinds of crucible steel castings; annual capacity, 600 tons. Fuel, oil. John H. Tobin, President and General Manager; C. A. Gerlinger, Vice-President; W. E. Gerlinger, Secretary and Treasurer.

Waukesha (The) Sheet Steel Company, Waukesha, Waukesha county. Built in 1901 and first put in operation November 4, 1901; 2 bar heating and 6 annealing furnaces, one bar mill, 6 sheet mills, and 3 cold mills; product, black plates for tinning and galvanized sheets; annual capacity, 18,000 tons. Fuel, coal, but peat may be used. A galvanizing plant is connected with the works. F. J. Patterson, President; John E. Jones, Vice-President and General Manager; Geo. Firmenich, Secretary and Treasurer.

West Superior Branch, United States Cast Iron Pipe and Foundry Company, 80 Broadway, New York. Works at West Superior, Douglas county, Wisconsin. 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. (A plant for the manufacture of cast-iron pipe is connected with these works and is operated by the United States Cast Iron Pipe and Foundry Company. It is not for sale or lease.)—*Bessemer converters and rolling mill idle and for sale or lease.*

Number of rolling mills and steel works in Wisconsin: 14. Of these one has a Bessemer steel plant, 2 make steel in special converters, 3 make open-hearth steel, and 8 have crucible steel plants.

MINNESOTA.

COKE FURNACES—1.

Zenith Furnace, Zenith Furnace Company, Wolvin Building, Duluth. Furnace at West Duluth, St. Louis county. One stack, 76 x 16, built in 1889–90; improved in 1899 and 1902; rebuilt in 1903; three Gordon-Whitwell-Cowper stoves; fuel, coke made principally at Duluth from Connellsville coal; ore, Mesabi; product, Bessemer, malleable, and foundry pig iron; annual capacity, 80,000 tons. Brand, "Zenith." Connected with the furnace are 50 Otto-Hoffman by-product coke ovens with an annual capacity of 90,000 tons. A. B. Wolvin, President, Duluth; C. P. Wheeler, Vice-President, Chicago; J. L. Washburn, Secretary, Duluth; C. W. Andrews, General Manager Coal, Coke, and Gas Departments, Duluth; George C. Foote, Superintendent, West Duluth. Selling agents, Pickands, Brown & Co., Chicago. (For-

merly called the West Duluth Furnace and operated by the Duluth Furnace Company.)—*Active in 1903.*

Number of furnaces in Minnesota: one coke stack.

ROLLING MILLS AND STEEL WORKS—2.

American Hoist and Derrick Company, St. Paul, Ramsey county. Branch offices, 60 South Canal st., Chicago; Taylor Building, New York City; 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 tons. Fuel, coke. Oliver Crosby, President; F. J. Johnson, Secretary; H. S. Wood, Treasurer.

Minnesota Iron Works, Republic Iron and Steel Company, Chicago. Works at Columbia Heights, Anoka county.—*Not in operation.* *See page 86.*

Number of rolling mills and steel works in Minnesota: 2. Of these one makes steel castings by the Tropenas process.

MISSOURI.

COKE FURNACES—1 COMPLETED AND 1 PROJECTED.

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 and two Gordon-Whitwell-Cowper stoves; fuel, Connellsville or Virginia coke; ores, Iron Mountain and West Plains; product, basic open-hearth, malleable Bessemer, car-wheel, and foundry pig iron cast in chills; annual capacity, 45,000 tons. Brands, "Missouri" for basic and "Carondelet" for foundry. Charles A. McNair, President; Arthur P. DeCamp, Vice-President; William Yule, Secretary; Frank B. DeCamp, General Manager. Sole selling agents, DeCamp Brothers and Yule Iron, Coal, and Coke Company, St. Louis.—*Active in 1903.*

PROJECTED COKE FURNACES—1.

Ozark (The) Blast Furnace Company, Kansas City. Contemplates erecting a blast furnace near Springfield, Greene county, for the manufacture of car-wheel pig iron; fuel to be used, coke; ore, local brown hematite; estimated annual capacity, 70,000 tons. A. J. Eisenmayer, President, Springfield, Mo.; M. T. Russell, Vice-President, Phœnix, Arizona; Frank Brasier, Secretary, and F. E. Wear, Treasurer, Kansas City, Mo.; George Cowie, Superintendent.

Number of coke furnaces in Missouri: one completed stack and one stack projected.

CHARCOAL FURNACES—1.

Sligo Furnace, Sligo Furnace Company, Wells Building, 509 Olive street, St. Louis. Furnace at Sligo, Dent county. 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 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. Edward F. Goltra, President, Erastus Wells, Treasurer, and J. D. Dana, Secretary, St. Louis; James G. McRoberts, Superintendent, Sligo. Sales made by the company.—*Active in 1903.*

Number of charcoal furnaces in Missouri: one stack.

Total number of furnaces in Missouri: 2 completed stacks and one stack projected. Of these one uses coke, one uses charcoal, and one stack to use coke is projected.

ROLLING MILLS AND STEEL WORKS—5.

Helmbacher Plant, Helmbacher Forge and Rolling Mills Company, Lincoln Trust Building, St. Louis. Works on 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 5 hammers; product, bar, rod, and band iron, coupling links and pins, car, tender, and locomotive axles, shafts, and all kinds of railroad, steamboat, and machinery forgings; annual capacity, 45,000 tons of rolled and 7,000 tons of forged products. Fuel, coal. E. Vaughan, Superintendent.—*See Madison Plant, page 339.*

Hirsch Rolling Mill Company, National Bank of Commerce Building, St. Louis. Works at Ecoff ave. and Missouri Pacific Railroad tracks; supply warehouse, 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, Jackson county. Works at cor. of Independence and Bristol aves. Built in 1887–8 and first put in operation in January, 1889; 2 heating furnaces and one 10-inch train of rolls; product, bar and bolt iron; also bolts, nuts, spikes, etc.; annual capacity, 21,000

tons of bar iron; also 10,000 tons of bolts, nuts, rivets, spikes, etc., which should come out of the bar iron capacity. Fuel, producer gas in rolling mill and petroleum and coal in bolt works. J. H. Sternbergh, President, and H. M. Sternbergh, Vice-President, Reading, Pa.; H. R. Warren, Secretary and Treasurer, and Solomon Stoddard, Manager, Kansas City, Missouri.

St. Louis Rolling Mills, National Enameling and Stamping Company, New York. Works at St. Louis, Missouri.—*See page 169.*

Scullin-Gallagher Iron and Steel Company, Kraft street and Manchester avenue, St. Louis. Built in 1899–1900; five 20-gross-ton basic open-hearth steel furnaces; first steel made in September, 1900; product, miscellaneous steel castings up to 60,000 pounds and bolsters and couplers; annual capacity, 40,000 tons. Fuel, manufactured gas. John Scullin, President; Thos. M. Gallagher, 1st Vice-President; Frank N. Johnson, 2d Vice-President; V. C. Turner, Secretary and Treasurer; John N. Maher, General Manager.

Number of rolling mills and steel works in Missouri: 5. Of these one makes steel castings by the open-hearth process.

KANSAS.

ROLLING MILLS—1.

Kansas City Plant, McKenna Steel Working Company, Colby and Abbot Building, Milwaukee, Wisconsin. Works at 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. Howard Morris, President; Harry L. Burrage, Treasurer; Charles M. Morris, Secretary; E. J. Tapping, Manager. (Owned and formerly operated by the American McKenna Process Company.)

Number of rolling mills in Kansas: one. No blast furnaces.

COLORADO.

COKE FURNACES—5 COMPLETED AND 1 BUILDING.

Minnequa Furnaces, The Colorado Fuel and Iron Company, Denver. Furnaces at Pueblo. Five completed stacks and one stack building; fuel, coke.—*For description see page 171.*

Number of coke furnaces in Colorado: 5 completed stacks and one stack building. There are no charcoal stacks in Colorado.

ROLLING MILLS AND STEEL WORKS—2 COMPLETED AND 1 PROJECTED.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and

Iron Company, Denver. Works at Pueblo.—*For description see pages 171–73.*

Union Rolling Mills, Union Iron and Steel Company, New York. Works at Denver, Colorado.—*For description see page 106.*

PROJECTED STEEL-CASTING PLANTS—1.

Denver (The) Steel Casting Company, 316 Majestic Building, Denver. Contemplates erecting works at South Denver, Denver county, to be equipped with 2 Siemens open-hearth steel furnaces (one 15-gross-ton acid and one 15-gross-ton basic); product, to be steel castings; estimated annual capacity, 6,000 tons of acid and 6,000 tons of basic castings. Fuel, producer gas and coke. Two 2-gross-ton Bessemer steel converters for the manufacture of castings may also be built. A. T. Herr, President and Manager; A. H. Phelps, Vice-President; Oscar Reuter, Secretary; Edward A. Bishop, Treasurer.

Number of rolling mills and steel works in Colorado: 2 completed and one projected. Of these one makes Bessemer steel ingots and open-hearth steel ingots and castings and one plant for the manufacture of open-hearth and Bessemer steel castings is projected.

WYOMING.

ROLLING MILLS—1.

Laramie Rolling Mills, Union Pacific Railroad Company, Laramie, Albany county. Built in 1874–5 and put in operation in April, 1875; 5 heating furnaces, 2 track spike machines, 2 nut machines, one heading and one threading machine, and 2 trains of rolls (one 10 and one 19-inch); product, bar iron, mine rails, railroad spikes, and bolts and nuts; annual capacity, about 18,000 tons of rolled products. Fuel, coal. (Formerly operated by the Laramie Iron and Steel Company, all the stock of which is owned by the Colorado Fuel and Iron Company.)—*Idle.*

Number of rolling mills in Wyoming: one.

UTAH.

PROJECTED BLAST FURNACES—1 MIXED CHARCOAL AND COKE FURNACE.

Utah (The) Iron and Mining Company, Ogden, Weber county. Contemplates erecting at Ogden one stack, to be 70 x 17, and to use mixed charcoal and coke for fuel; ore, local; product, to be foundry pig iron; estimated annual capacity, 50,000 tons. L. W. Shurtliff, President; Peter G. Lamoreaux, Vice-President; Frank M. Farrell, Treasurer; Thomas B. Farr, Secretary.

Number of blast furnaces in Utah: one projected.

WASHINGTON.

CHARCOAL FURNACES—1.

Irondale Furnace, The Pacific Steel Company, M. J. Carrigan, Receiver, Seattle. Furnace at Irondale, via Port Townsend, Jefferson county. One stack, 50 x 10, built in 1880–1; blown in January 27, 1881; rebuilt in 1882–3, remodeled in 1884, overhauled in 1901, and enlarged in 1903; closed top, with patent bell and hopper; iron stove; fuel, charcoal alone, coke alone, and charcoal and coke mixed; coke obtained from Comox, British Columbia, and Cokedale, Washington; ores, magnetites from Texada Island and Barclay Sound, British Columbia, and hematite from Hamilton, Washington; product, foundry pig iron; annual capacity, 18,000 tons.—*Active in 1903.*

Number of furnaces in Washington: one stack.

ROLLING MILLS—1.

Seattle Steel Company, Starr-Boyd Building, Seattle. Works at Lakeview, Pierce county. Built in 1894, using machinery from the dismantled mill of the Holcomb-Brown Iron Company, of Burlington, Iowa; first put in operation May 1, 1895; 3 coal heating furnaces, 2 trains of rolls, (9 and 16-inch,) and one 30-ton hammer; product, merchant bar iron; annual capacity, 24,000 tons. Fuel, bituminous coal. E. M. Wilson, President and Manager, William Pigott, Vice-President and Treasurer, William S. Burt, Secretary, Seattle. (Formerly operated by the Western Iron and Steel Company.)—*To be dismantled; machinery to be utilized in equipping the company's new plant at West Seattle, Washington. See Building Rolling Mills in this State.*

BUILDING ROLLING MILLS—1.

Seattle Steel Company, Starr-Boyd Building, Seattle, King county. Building works at West Seattle to be equipped with 6 busheling furnaces, 4 heating furnaces, and 3 trains of rolls (one 9, one 12, and one 16-inch); the 9 and 16-inch trains are to be removed from the company's plant at Lakeview, Washington, and installed in these works; product, to be bar iron, flats, rounds, squares, angles, channels, spikes, and 8, 12, 16, and 20-lb. tee rails; estimated annual capacity, 15,000 tons. Fuel to be used, coal and petroleum. A 22-inch mill may be added; also two 15-gross-ton open-hearth steel furnaces.—*See Completed Rolling Mills, this page.*

PROJECTED ROLLING MILLS—1.

Vulcan (The) Iron Works, Seattle, King county. Now manufacture all classes of machinery and iron and steel bolts and nuts;

contemplate adding trains of rolls for the manufacture of bar iron, etc. I. Hulme, President and Manager; H. P. Strickland, Secretary and Treasurer.

Number of rolling mills in Washington: one completed, one building, and one projected. Open-hearth steel furnaces may also be built by the Seattle Steel Company, at West Seattle.

OREGON.

CHARCOAL FURNACES—1.

Oswego Furnace, Oregon Iron and Steel Company, Oswego, Clackamas county. Main office and telegraph address, Sherlock Building, Portland. One stack, 60 x 13, built in 1888 and first blown in in October, 1888; three Whitwell stoves; hot blast; iron shell; fuel, charcoal, made exclusively from fir; ore, 35 per cent. brown hematite, worked part raw and part roasted, using a Davis & Colby kiln; product, No. 1 foundry pig iron; annual capacity, 15,000 tons. Brand, "Oregon." 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.*

Number of furnaces in Oregon: one charcoal stack.

ROLLING MILLS AND STEEL WORKS—2.

Columbia Engineering Works, Incorporated, Tenth and Johnson sts., Portland, Multnomah county. Built in 1903 and first steel made May 1, 1903; one 2-gross-ton surface-blown Bessemer steel converter, with special arrangement of tuyeres, 2 cupolas, and one annealing furnace; product, steel castings; annual capacity, 1,200 tons. Fuel, crude oil. S. M. Mears, President; R. R. Hoge, Vice-President; Fred. Hesse, Secretary and Manager; Taylor Goodrich, Treasurer; John Wood, Superintendent.

Rolling Mill Department, Pacific Hardware and Steel Company, Mission and Fremont streets, San Francisco, California. Branch office, Gerken Building, New York. Works at Portland, Multnomah county, Oregon. Built in 1892 and first put in operation in September, 1892; one heating furnace and 2 trains of rolls (one 10 and one 16-inch); product, bar, band, and hoop iron; annual capacity, 6,000 tons. Fuel, crude oil. A. L. Scott, President, H. J. Morton, First Vice-President, Joseph Sloss, Second Vice-President and Treasurer, and Dan H. Kane, Secretary, San Francisco; N. E. Ayer, Manager, Portland. (Formerly called the Portland Rolling Mills.)

Number of rolling mills and steel works in Oregon: 2. Of these one makes Bessemer steel castings.

CALIFORNIA.

ROLLING MILLS AND STEEL WORKS—5 COMPLETED AND 1 PROJECTED.

California Industrial Company's Rolling Mill, California Industrial Company, Fourth st. and Santa Fe ave., Los Angeles, Los Angeles county. 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 of that year; 3 heating furnaces, 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. Brand, "C. I. Co." Frederick H. Rindge, President; J. S. Torrance, 1st Vice-President; Lyman Stewart, 2d Vice-President; S. I. Merrill, Secretary, Treasurer, and Manager. (Formerly called the Los Angeles Iron and Steel Works.)

Judson Manufacturing Company, Oakland, Alameda county. Office and salesroom, cor. Howard and Beale sts., 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, 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, 500 tons of bolts and spikes, 4,000 tons of bridge and house work, 1,000 tons of cold-drawn shafting, and 2,000 tons of iron castings. Fuel, oil. Brand, "Judson." H. E. Bothin, President and General Manager; J. D. Osborne, Secretary. Sales made by the San Francisco office.

Pacific Jupiter Steel Company, 409 Crossley Building, 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; product, all kinds of steel castings; annual capacity, 8,000 tons. Fuel, oil. M. M. Ogden, President; W. N. Goodwin, Vice-President; R. B. Murdock, Secretary; B. D. Pike, Treasurer; Matthew Arnold, Manager.

Southern Pacific Company Rolling Mill, Southern Pacific Company, Sacramento, Sacramento county. 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." H. J. Small, General Manager of Mill.

Union Iron Works, San Francisco. Works in the Potrero. All the stock of the Union Iron Works is owned by the United States Shipbuilding Company.—*See page 93.*

PROJECTED STEEL PLANTS—1.

Abner Doble Company, cor. Fremont and Howard sts., San Francisco. Contemplates erecting an open-hearth steel plant in the Potrero, to be equipped with one 10-gross-ton basic Wellman rolling furnace; product, to be steel castings; annual capacity, 6,000 tons. Fuel, California crude oil. William A. Doble, President; Wellington Gregg, Jr., Vice-President; Julius C. Lutgen, Secretary; the Crocker Woolworth Bank, Treasurer.

Number of rolling mills and steel works in California: 5 completed and one projected. Of these one makes Tropenas steel, one makes open-hearth steel, and one open-hearth steel plant is projected.

UNITED STATES.

Total number of furnaces in the United States in June, 1904, which were then active or may some time be put in blast: 428 blast furnaces and 5 electric furnaces. Of these 287 use coke alone as fuel, 9 use bituminous coal and coke mixed, 5 use anthracite coal alone, 71 use anthracite coal and coke mixed, 56 use charcoal alone, and 5 use electricity. In addition there were 16 furnaces being built, one furnace being rebuilt, and 7 furnaces projected. One furnace was also partly erected and work suspended.

Total number of completed furnaces in November, 1901: 406.

Total number of rolling mills and steel works in the United States in June, 1904: 572 completed, 12 building, one rebuilding, 2 partly erected, and 14 projected. Of these 32 have standard Bessemer steel plants and 2 Bessemer steel plants are projected; one has a Clapp-Griffiths steel plant, 2 have Robert-Bessemer steel plants, 10 have Tropenas steel plants and 2 Tropenas steel plants are projected, one has an Evans-Wills steel plant, one has a Bookwalter steel plant and one Bookwalter steel plant is being built, and 4 plants make steel in special Bessemer converters; 135 have open-hearth steel plants, 5 open-hearth steel plants are being built, 2 open-hearth steel plants are partly erected, and 17 open-hearth steel plants are projected; 57 have crucible steel plants, 8 have plants for making cemented steel and one plant to treat castings by the cementation process is projected, 3 have plants for making special steel and one special-process steel plant is being built, and 2 have plants for making McHaffie steel.

Total number of completed works in November, 1901: 527.

Total number of forges and bloomaries in the United States in June, 1904, which make hammered blooms, billets, etc., for sale: 9 completed and one building. Total in November, 1901: 10.

LONG INACTIVE, ABANDONED, OR DISMANTLED IRON AND STEEL WORKS.

This list embraces blast furnaces, rolling mills, steel works, and forges and bloomaries which have been abandoned or dismantled since the Directory for 1901 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 1901 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, Richmond Iron Company; main office, Richmond, Berkshire county. Furnace at Van Deusenville. One stack, 32 x 9½, built in 1834 and rebuilt in 1858; last active in 1896; fuel, charcoal.—*Abandoned.*

CONNECTICUT.

BLAST FURNACES.

Landon Furnace, The Landon Iron Company, Chapinville, Litchfield county. One stack, 32 x 9, built in 1825; fuel, charcoal. —*Dismantled.*

Sharon Valley Furnace, Barnum Richardson Company, Lime Rock. Furnace at Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; fuel, charcoal.—*Abandoned.*

ROLLING MILLS AND STEEL WORKS.

Driggs-Seabury Gun and Ammunition Company, Derby, New Haven county. One 2-gross-ton side-blown acid Tropenas steel converter built in 1898 and first blow made in May, 1898; product, steel castings.—*Converter dismantled in 1903.*

Windsor Locks Steel Works, Farist & Windsor, Bridgeport. Works at Windsor Locks, Hartford county. Built in 1860; equipped with trains of rolls and crucible steel furnaces; product, merchant steel, tack plate, and tool and die steel.—*Dismantled.*

NEW YORK.

BLAST FURNACES.

Burden Iron Works, The Burden Iron Company, Troy. One stack, 60 x 14½, built in 1867; fuel, anthracite coal and coke.—*Abandoned in 1903.*

Crown Point Furnaces, American Steel and Wire Company of New Jersey, Chicago. Furnaces at Crown Point, Essex county, New York. Two stacks, 60 x 17 and 70 x 18, built in 1872–3; the second stack rebuilt in 1881; fuel, coke.—*Dismantled in 1903.*

Sterling Iron and Railway Company, 51 Wall st., New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 13, built as a charcoal furnace in 1806 and changed to anthracite in 1868, and Sterling, 42 x 14, built as a charcoal furnace in 1848 and changed to anthracite in 1866.—*Dismantled.*

ROLLING MILLS AND STEEL WORKS.

Astoria Steel Company, Calby M. Chester, Jr., Receiver, 44 Pine st., New York. Works at Astoria, Queens county. Built in 1900; equipped with open-hearth furnaces, one blooming mill, and one wire-rod mill; product, billets and wire rods.—*Trains of rolls dismantled. Works now make steel castings only.* *See page 199.*

Newburgh Works, American Steel and Wire Company of New Jersey, Chicago. Works at Newburgh, New York. Built in 1890; product, wire rods, wire, and wire nails.—*Dismantled.*

Rensselaer Iron Works, American Steel and Wire Company of New Jersey, Chicago. Works at Troy, New York. Established in 1846; merchant mill built in 1866 and 1867; new merchant mill built in 1877 and 1878; product, steel shapes and sheets and merchant steel of all kinds.—*Dismantled.*

Rome Steel Company, Rome, Oneida county. Built in 1900 and first put in operation in March, 1900; product, angles and rods for bedsteads, rerolled from old steel rails.—*Dismantled in 1901.*

Syracuse Works, American Steel Casting Company, Chester, Pa. Works at Geddes, Onondaga county, New York. Built in 1886; open-hearth steel plant added in 1890 and enlarged in 1891; first castings made in November, 1890; burned in 1892 and rebuilt and enlarged in the same year; two 10-gross-ton Siemens acid open-hearth furnaces; product, steel castings.—*Abandoned.*

IRON-ORE FORGES.

Russia Iron Works, The Delaware and Hudson Company, Chateaugay Ore and Iron Department, Standish. Forge at Moffittsville, Clinton county. Built in 1844; product, blooms and billets; fuel, charcoal.—*Machinery dismantled in 1901.*

NEW JERSEY.

BLAST FURNACES.

Franklin Furnace, Lackawanna Iron and Steel Company, Lebanon, Pa. Furnace at Franklin Furnace P. O., Sussex county, New Jersey. One stack, 67 x 16½, completed in October, 1873, and blown in January 1, 1874; abandoned in 1898 and revived in 1899; fuel, anthracite coal and coke.—*Dismantled.*

Musconetcong Furnace, Musconetcong Iron Works, Stanhope, Sussex county. One stack, No. 1, 70 x 17, built in 1841; fuel, anthracite coal and coke.—*Dismantled in 1902.*

ROLLING MILLS AND STEEL WORKS.

Carteret Steel Company, 150 Broadway, New York. Works at Carteret, Middlesex county, New Jersey. Built in 1896; one 5-gross-ton basic open-hearth steel furnace erected for experimental purposes; product, half-ton ingots.—*Dismantled in 1902.*

Graphite Metal Company, 15 Cortlandt st., New York. Works at Garwood, Union county, New Jersey. Buildings erected in 1898; three special furnaces; first steel made in February, 1901; product, graphitic steel castings.—*Steel department abandoned.*

Harvey Steel Company, Brills Station, Newark, Essex county. Built in 1889; equipped with one train of rolls and two 4-pot crucible steel-melting holes.—*Dismantled.*

New York Switch and Crossing Company, Fifteenth and Madison sts., Hoboken. One 7-gross-ton acid open-hearth steel furnace built in 1894; three 6-pot crucible steel-melting holes built in 1896–7; product, steel castings.—*Crucible department dismantled in 1898. Open-hearth furnace idle and for sale.*

Oliphant Steel and Iron Company, Trenton. Built in 1900 and first steel made in November, 1900; one 6-gross-ton acid open-hearth steel furnace; product, steel castings.—*Dismantled in 1902.*

Uniform Steel Company, Belleville. Built in 1901 and first steel made May 20, 1901; twelve 4-pot crucible furnaces; product, tools, dies, and high-grade machine castings.—*Abandoned in 1902.*

PIG AND SCRAP IRON BLOOMARIES.

Paterson Bloomary, Isaac P. Oberg, Paterson, Passaic county. Built in 1878; product, charcoal blooms and charcoal iron for boiler plate and wire; annual capacity, 2,250 tons.—*Dismantled in 1901.*

PENNSYLVANIA.

BLAST FURNACES.

Conewago Furnace, Conewago Iron Company, Middletown, Dauphin county. One stack, 45 x 11, built in 1853 and rebuilt in 1879;

fuel, anthracite coal and coke. (Formerly called the Middletown Furnace.)—*Dismantled.*

Coplay Iron Company, Coplay, Lehigh county. Two stacks: one, 55 x 16, built in 1862; open top; and one, 70 x 15, built in 1868 and rebuilt in 1889; closed top; fuel, anthracite coal and coke. —*Dismantled in 1898.*

Duncannon Furnace, The Duncannon Iron Company, Duncannon, Perry county. One stack, 60 x 15, built in 1853 and rebuilt in 1880; fuel, anthracite coal and coke.—*Dismantled.*

Edith Furnace, American Steel and Wire Company of New Jersey, Chicago. Furnace in Allegheny City. One stack, 75 x 16½, built in 1882; fuel, coke.—*Abandoned.* *See page 41.*

Emma Furnace, Logan Iron and Steel Company, Burnham, Mifflin county. One coke stack, 54 x 10½, built in 1867.—*Dismantled.*

Falling Spring Furnace, Chambersburg, Franklin county. One stack, 40 x 8½, built in 1880; fuel, charcoal.—*Virtually dismantled.*

Gap Furnace, McKee, Blair county. One stack, 49½ x 11½, built in 1840; remodeled in 1877 and 1881; fuel, coke.—*Dismantled in 1897.*

Hokendauqua Furnace No. 4, The Thomas Iron Company, Easton. Furnace at Hokendauqua, Lehigh county. One stack, 65 x 17, built in 1863; fuel, anthracite and coke.—*Abandoned in 1902.*

Jefferson Furnace, Mrs. J. M. Kaufman, Auburn. Furnace at Jefferson Station, Schuylkill county. One iron stack, 33 x 8, first put in blast May 20, 1880; fuel, charcoal.—*Dismantled.*

Keystone Furnace, Reading Iron Company, Reading. One stack, 65 x 14½, built in 1873; fuel, anthracite and coke.—*Dismantled.*

Lackawanna Furnace, Lackawanna Iron and Steel Company, Lebanon. Furnace at Scranton. One stack, No. 3, 75 x 16½, originally built in 1852; changed to No. 4 in 1874 and to No. 3 in 1901; fuel, anthracite coal and coke.—*Dismantled in 1902.*

Little Giant Furnace, Neal Brothers, Pittsburgh. Furnace in Allegheny City. One stack, 40 x 6, built in 1889; fuel, coke.—*Dismantled about 1896.*

Lucinda Furnace, Lucinda Furnace Company, Norristown, Montgomery county. One stack, 55 x 14, built in 1856; rebuilt and enlarged in 1888–9; fuel, anthracite coal and coke.—*Dismantled.*

Marietta Furnaces, Marietta, Lancaster county. Two stacks, one 50 x 12½, built in 1847, and remodeled in 1880, and one, 38 x 12, built in 1849; fuel, anthracite coal and coke.—*Dismantled in 1900.*

Mont Alto Furnace, Mont Alto Iron Company, David Knepper, Receiver, Mont Alto. One stack, 30 x 9, built in 1807–8 and size increased to 45 x 9½ in 1881; burned in 1889 and rebuilt in the same year to 50 x 11; fuel, charcoal.—*Dismantled in 1902.*

New Castle Furnace No. 3, Carnegie Steel Company, Pittsburgh.

Furnace at New Castle. One stack, 75 x 18½, built and blown in in 1872; rebuilt in 1885; fuel, coke.—*Dismantled in 1903.*

Pine Grove Furnace, South Mountain Mining and Iron Company, Pine Grove Furnace P. O., Cumberland county. One stack, 53 x 9, built in 1770; fuel, charcoal.—*Dismantled in 1902.*

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; fuel, anthracite coal.—*Abandoned.*

Richmond Furnace, Richmond Furnace P. O., Franklin county. One stack, 36 x 9½, built in 1865 and rebuilt in 1875; fuel, anthracite coal and coke.—*Dismantled.*

Sharon Furnace, Carnegie Steel Company, Pittsburgh. Furnace at Sharon, Mercer county. One alternate stack, 75 x 18, built in 1865 and rebuilt in 1887; fuel, coke.—*Dismantled in 1901.*

Swatara Furnace, The McCormick Estate, 223 Market st., Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854 and remodeled in 1880; fuel, anthracite coal and coke.—*Dismantled in 1902.*

Tom Thumb Furnace, Arthur Losey, Point Marion, Fayette county. One stack, 20 x 4⅓, built in 1900 and blown in October 22, 1900; destroyed by an explosion the same day; fuel, coke.—*Dismantled.*

ROLLING MILLS AND STEEL WORKS.

Apollo Works, American Sheet Steel Company, New York. Works at Apollo, Armstrong county, Pa. Built in 1850 and rebuilt in 1886; equipped with trains of rolls and two 20-gross-ton acid open-hearth steel furnaces; first steel made June 15, 1886; product, ingots and black sheets for galvanizing.—*Dismantled in 1902.*

Beaver Falls Works, American Steel and Wire Company of New Jersey, Chicago. Works at Beaver Falls, Beaver county, Pa. Built and put in operation in 1883 by the Hartman Steel Company, Limited; product, steel wire rods, plain, galvanized, and coppered market wire, barbed wire, and wire nails.—*Dismantled in 1903.*

Bethlehem Steel Company, South Bethlehem, Northampton county. Four 7½-gross-ton Bessemer steel converters; first blow made October 4, 1873.—*Converters only dismantled in 1902. For a description of the remainder of the plant see pages 91–2.*

Bridgewater Steel Works, West Bridgewater, Beaver county. Experimental works for the manufacture of rolled car axles erected in 1900.—*Dismantled.*

Catasauqua Rolling Mill, H. Sofranscy & Son, Allentown. Works at Catasauqua. Product, bar iron and skelp.—*Dismantled in 1904.*

Chartiers Works, American Sheet Steel Company, New York.

Works at Carnegie. Built in 1883–4 and put in operation August 13, 1884; product, sheet iron and steel.—*Dismantled in 1901.*

Clark Mill, American Steel Hoop Company, Pittsburgh. Works at Thirty-fifth st., A. V. Railway, and Allegheny river, Pittsburgh. Two 12-gross-ton acid open-hearth steel furnaces built in 1889–90.—*Open-hearth furnaces only dismantled in 1901. For a description of the remainder of the plant see page 10.*

Clinton Rolling Mill, Clinton Iron and Steel Company, South Side, Pittsburgh. Built in 1846; product, plate iron.—*Dismantled.*

Ellwood City Works, American Tin Plate Company, New York. Works at Ellwood City, Lawrence county, Pa. Built in 1892–3 and first put in operation April 1, 1893; product, black plates for tinning and cold-rolled steel sheets.—*Dismantled in 1902.*

Fullerton Rolling Mill, Frank Samuel, Harrison Building, Philadelphia. Works at Fullerton, Lehigh county. Product, bar iron and skelp.—*Dismantled in 1903.*

Harrisburg Nail Works, 223 Market st., Harrisburg. Works at Fairview, Cumberland county, on the Northern Central Railway. Built in 1810; product, muck bar.—*Dismantled in 1903.*

Hartman (The) Manufacturing Company, New Castle. Contemplated adding 3 Bessemer steel converters and 2 wire-rod trains to a wire-drawing and wire-nail plant.—*Proposed additions abandoned.*

Hussey Steel Works, Union Spring and Manufacturing Company, New Kensington, Westmoreland county. Built in 1891, destroyed by fire in August, 1892, and rebuilt in 1893; 3 heating furnaces, 3 annealing furnaces, 3 trains of hot rolls, (one 10, one 16, and one 18-inch,) and 4 trains of 10-inch cold rolls; product, bars, bands, cold-rolled strips, and deep stamping and deep drawing stock. (Formerly operated by the Hussey Steel Company.) —*Cold rolls sold and dismantled; other machinery for sale.*

Johnstown Works, American Tin Plate Company, New York. Works at Johnstown. Built in 1898 and first put in operation in May, 1898; product, black plates for tinning.—*Dismantled in 1901.*

Jupiter Steel Works, Jupiter Steel and Coal Company, Pittsburgh. Works for the manufacture of open-hearth and crucible steel near Carnegie, Allegheny county, projected.—*Enterprise abandoned.*

Keystone Iron Works, Reading. Built in 1857; product, boiler plate, skelp, tank, car iron, etc.—*Machinery dismantled in 1902.*

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons Iron and Steel Works, Tacony, Philadelphia. One 30-gross-ton steel cementing furnace.—*Cementing furnace only dismantled. For a description of the remainder of the plant see page 113.*

Liggett Spring and Axle Company, Pittsburgh. Works at Beaver ave. and Fayette st., Allegheny. Built in 1865 and 1882; prod-

uct, buggy and wagon axles.—*Machinery removed in 1903–4 to a new plant at Axleton, Allegheny county. See pages 251–52.*

McInnes (The) Steel Company, Emporium, Cameron county. Works for the manufacture of crucible steel erected in 1894; product, "McInnes" tool steel.—*Dismantled in 1901.*

Norristown Iron Company, Norristown, Montgomery county. Built in 1846; product, skelp and bar iron.—*Dismantled in 1902 and machinery removed to Lebanon and utilized in equipping the rolling mill of the Lebanon Valley Iron Company. See page 238.*

Norristown Works, American Steel Casting Company, Chester, Pa. Works at Earnest Station, Norristown, Montgomery county. Built in 1890–1 and first steel made September 3, 1891; two 15-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings.—*Open-hearth furnaces dismantled.*

North Works, Lackawanna Iron and Steel Company, Lebanon. Works at Scranton, Lackawanna county. Commenced operations in 1840; equipped with trains of rolls and three 7-gross-ton Bessemer steel converters; first blow made October 23, 1875, and first steel rail rolled December 29, 1875; product, ingots, rails, etc.—*Dismantled in 1902.*

Pittsburgh Works, American Steel Casting Company, Chester, Delaware county. Works at Twenty-sixth and Railroad sts., Pittsburgh. Built in 1871; 2 acid open-hearth furnaces; product, castings.—*Dismantled in 1900.*

Pottstown Iron Works, Glasgow Iron Company, Pottstown, Montgomery county. One 12-gross-ton Siemens basic open-hearth steel furnace built in 1885–6.—*Dismantled. For a description of the remainder of the plant see page 127.*

Rolling (The) Mill Company of America, South Connellsville, Fayette county. Works for the manufacture of sheets partly erected in 1902; work suspended in that year.—*Machinery removed to Morgantown, West Va., in 1902 and utilized in equipping the works of the Morgantown Tin Plate Company. See page 286.*

Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Works on the South Side, below the Monongahela bridge. Built in 1825; product, bars, angles, sheets, and plates.—*Dismantled in 1903 and machinery removed to Connellsville, Fayette county, Pennsylvania. See page 271.*

South Side Works, American Steel and Wire Company of New Jersey, Chicago. Works at Eighth and Bingham sts., Pittsburgh. Rod mill built in 1884 and first put in operation June 12, 1884; product, wire rods, wire, and wire nails.—*Dismantled in 1903.*

South Works, Lackawanna Iron and Steel Company, Lebanon. Works at Scranton, Lackawanna county. Built in 1881–3;

equipped with trains of rolls and two 9-gross-ton Bessemer steel converters; first blow made March 29, 1883, and first steel rail rolled May 4, 1883; product, ingots and steel rails.—*Dismantled in 1902.*

Sunbury Iron Works, Sunbury, Northumberland county. Built in 1883 and first put in operation in August, 1883; product, puddled bars and cut nails.—*Dismantled in 1902.*

Totten and Hogg Iron and Steel Foundry Company, Twenty-fourth st. and A. V. Railway, Pittsburgh. One 15-gross-ton acid open-hearth steel furnace; product, steel castings.—*Open-hearth furnace abandoned. Company operates an iron foundry.*

Walter Steel Company, Reading, Berks county. Built in 1899; product, crucible steel castings.—*Dismantled in 1900.*

PIG AND SCRAP IRON BLOOMARIES.

French Creek Forge, D. J. Knauer, St. Peters P. O., Chester county. Built in 1872; product, charcoal blooms made from scrap iron; fuel, charcoal.—*Dismantled.*

Mont Alto Iron Works, Mont Alto Iron Company, David Knepper, Receiver, Mont Alto. Built in 1866; product, charcoal blooms for all purposes; fuel, charcoal.—*Dismantled in 1902.*

MARYLAND.

BLAST FURNACES.

Isabella Furnace, Blue Mountain Iron and Steel Company, Hale Building, Philadelphia. Furnace at Catoctin, Maryland. One stack, 32 x 9, built in 1856; fuel, charcoal.—*Practically dismantled.*

ROLLING MILLS.

North East Works, McCullough Iron Company, Equitable Building, Wilmington, Delaware. Works at North East, Cecil county, Maryland. Rolling mill built in 1847; partly destroyed by fire in 1894 but rebuilt in the same year; product, sheet iron for galvanizing. A forge connected with the works was built in 1847 and 1875; product, charcoal blooms, all consumed in the company's rolling mills.—*Both works idle and to be dismantled.*

VIRGINIA.

BLAST FURNACES.

Cedar Run Furnace, Graham & Robinson, Grahams Forge, Wythe county. One stack, 32 x 9, built in 1832; cold blast; water power; ore mined on the furnace property; specialty, pig iron for car wheels and chilled rolls; daily capacity, 7 tons; fuel, charcoal. Charcoal pits are connected with the furnace.—*Idle for several years and not likely to resume operations.*

Lynchburg Furnace, Lynchburg, Campbell county. One stack, 60 x 11¾, first put in blast in December, 1880; remodeled in 1882 and 1884; fuel, coke.—*Dismantled.*

ROLLING MILLS.

Iron Gate Rolling Mill, Iron Gate, Alleghany county. Built in 1890–1; product, muck bar, merchant iron, light iron and steel rails, etc.—*Dismantled in 1902.*

Virginia Nail and Iron Works, Reusens, Campbell county. Built in 1867 and refitted in 1880; product, guide iron, round, square, and flat bar iron, and light tee rails.—*Dismantled about 1902.*

WEST VIRGINIA.

BLAST FURNACES.

Bettie Furnace, Black Band Iron and Coal Company, Spring Hill, Kanawha county. One stack, 50 x 10½, built in 1882–3; fuel, raw bituminous coal.—*Dismantled in 1901.*

ROLLING MILLS.

Riverside Bar Mill, (Riverside Department,) National Tube Company, Pittsburgh. Works at Wheeling, West Virginia. Built in 1875; product, steel skelp.—*Dismantled in 1902.*

West Virginia Steel Company, Wheeling. Commenced the erection in December, 1899, of a plant for the manufacture of sheets for roofing and stamping.—*Never completed; dismantled.*

KENTUCKY.

OPEN-HEARTH STEEL WORKS.

Mitchell-Tranter Works, Republic Iron and Steel Company, First National Bank Building, Chicago. Works at Covington, Kentucky. One 7-gross-ton acid open-hearth steel furnace built in 1879; product, ingots.—*Open-hearth furnace only dismantled. For a description of the remainder of the plant see page 86.*

TENNESSEE.

BLAST FURNACES.

South Pittsburg Furnace, Tennessee Coal, Iron, and Railroad Company, Birmingham, Alabama. Furnace at South Pittsburg, Tennessee. One stack, No. 1, 70 x 18, first blown in in May, 1879; fuel, coke.—*Partly dismantled in 1903. For a description of the two remaining South Pittsburg Furnaces see pages 181–82.*

ROLLING MILLS.

Knoxville Iron Company, Knoxville, Knox county. Two works: Harriman Works, Harriman, Roane county; built at Chattanoo-

ga and first started in October, 1876; removed to Harriman in 1891 and put in operation in September, 1891; product, bar iron, 12 to 30-lb. tee rails, all sizes of fish plates, etc.; (formerly called the Harriman Rolling Mill.) Knoxville Works, Knoxville, Knox county; built in 1865; product, merchant bars, fish-plates, bolts, and light tee and street rails.—*Both works dismantled in 1902-3; part of the machinery used by the company in equipping new works at Lonsdale, a suburb of Knoxville.* *See page 296.*

IRON-ORE FORGES.

Harriman (The) Wrought Iron Company, 76 Montgomery st., Jersey City, N. J. Experimental plant built at Harriman, Roane county, Tenn., in 1891 for the production of wrought iron direct from the ore by the Neville process.—*Dismantled in 1898.*

NORTH CAROLINA.

BLAST FURNACES.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 240 South Third st. One stack, 50 x 11½, built in 1883-4; blown in April 16, 1884; hot and cold blast; fuel, coke, but formerly used charcoal; ore, magnetic; product, pig iron of Bessemer quality; annual capacity, 5,200 tons.—*Abandoned and may be dismantled.*

IRON-ORE FORGES.

Helton Forge, W. J. Pasley, Crumpler, Ashe county. Built in 1859; 2 fires and one hammer; product, bar iron; fuel, charcoal.—*Abandoned. This was the last of the Catalan forges in the South.*

GEORGIA.

BLAST FURNACES.

Etna Furnace, Etna Manufacturing Company, Etna P. O., Polk county. One stack, 45 x 10, built in 1870; rebuilt in 1889; hot blast; ore, brown hematite mined on the furnace property; fuel, charcoal; product, strictly first-class car-wheel pig iron; annual capacity, 10,000 tons.—*Idle for several years and likely to remain long inactive.*

Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located 8 miles north of Rome. One stack, 60 x 10, built in 1874; fuel, charcoal.—*Dismantled.*

ROLLING MILLS.

Atlanta Mill, American Steel Hoop Company, Pittsburgh. Works at Atlanta, Georgia. Built in 1900 and first put in operation in July, 1900; product, hoops and cotton-ties.—*Dismantled in 1902.*

ALABAMA.

BLAST FURNACES.

Bibb Furnace, Southern Mineral Land Company, Brierfield, Bibb county. One stack, 55 x 12, built in 1864 to use charcoal; rebuilt in 1881 and remodeled in 1886 to use coke; returned to the use of charcoal in 1890; rebuilt in 1892; warm blast; ore, brown hematite mined in the vicinity; product, car-wheel pig iron; annual capacity, 14,500 tons. Brand, "Bibb."—*Idle since 1894 and for sale or lease. See Brierfield Rolling Mill, this page.*

Decatur Charcoal Iron Furnace, The Decatur Land Company, New Decatur, Morgan county. One stack, 60 x 12, built in 1887–8 and blown in February 23, 1890; fuel, charcoal.—*Dismantled in 1900.*

Edwards Furnace, H. F. De Bardeleben, Birmingham. Furnace at Woodstock, Bibb county. One stack, 70 x 15, first blown in June 10, 1880; remodeled in 1887 and in 1890; fuel, coke.—*Dismantled.*

Mary Pratt Furnace, Alabama Consolidated Coal and Iron Company, Birmingham. One stack, 65 x 14, built in 1882 and first put in blast in April, 1883; rebuilt in 1889 and overhauled in 1900; fuel, coke.—*Dismantled in 1903.*

ROLLING MILLS.

Brierfield Rolling Mill, Southern Mineral Land Company, Brierfield, Bibb county. Built in 1863, rebuilt in 1882–3, and put in operation in August, 1883; 10 double and 4 single puddling furnaces, 5 heating furnaces, three 18-inch trains of rolls, and 72 cut-nail machines; product, merchant bar iron and nails; annual capacity, 12,000 tons.—*Idle and for sale or lease. See Bibb Furnace, this page.*

TEXAS.

STEEL WORKS.

Kelly (G. A.) Plow Company, Longview, Gregg county. One 1-gross-ton Tropenas steel converter built in 1899 by the Longview Kelly Plow Manufacturing Company and first steel made in December, 1899; product, steel castings.—*Dismantled in 1903.*

OHIO.

BLAST FURNACES.

Grace Furnace, The Brier Hill Iron and Coal Company, Youngstown. One stack, No. 1, 80 x 18, built in 1861, torn down in 1873, and rebuilt in 1882; fuel, coke.—*Dismantled in 1898.*

Huron Furnace, Jackson, Jackson county. One stack, 49 x 13, first blown in April 19, 1875, and rebuilt in 1889; fuel, raw coal and coke.—*Dismantled.*

Madison Furnace, The Southern Ohio Portland Cement Company, Spitzer Building, Toledo. Furnace at Rempel, Jackson county. One stack, 40 x 11, built in 1854; hot blast; closed top; fuel, charcoal; ores, native and Lake Superior; product, car-wheel, cylinder, and foundry pig iron; annual capacity, 4,000 tons. (Formerly operated by the Wellston Iron and Steel Company.)—*Last active in 1902. Not likely to resume operations in the near future.*

Mount Vernon Furnace, The Vernon Iron Company, Ironton. Furnace at Campbell, Lawrence county. One stack, 32 x 10½, built in 1833; fuel, charcoal.—*Dismantled in 1903.*

New York and Western Coal Company, Columbus. Two stacks: Helen Furnace, at Orbiston, one stack, 52 x 15, built in 1877 and first blown in in December, 1877. XX Furnace, at Shawnee, one stack, 50 x 14, built in 1876–7 and first blown in January 18, 1877. Fuel, mainly raw coal mixed with some coke.—*Helen Furnace dismantled in 1899 and XX Furnace dismantled in 1896.*

Scioto Furnace, Scioto Furnace post office, Scioto county. One stack, 32 x 10¾, built in 1826 and rebuilt in 1844; fuel, charcoal.—*Idle for many years and practically dismantled in 1896.*

ROLLING MILLS AND STEEL WORKS.

Banfield Works, American Tin Plate Company, New York. Works at Irondale, Ohio. Originally built by the Pioneer Iron Company in 1868; product, black plates for tinning.—*Dismantled in 1902.*

Bridgeport Mill, American Steel Hoop Company, Pittsburgh. Works at Bridgeport, Belmont county, Ohio. Built in 1873 and put in operation January 1, 1874; enlarged in 1883 and 1891; product, steel bars, light tee rails, angles, etc.—*Dismantled in 1901.*

Canton (The) Saw Company, Canton, Stark county. One crucible steel-melting furnace with 2 pots added to a saw plant in 1900; first steel made in the fall of 1900; product, small machine castings; annual capacity, 50 tons.—*Abandoned.*

Cleveland Works, Republic Iron and Steel Company, Chicago. Works at Cleveland. Built in 1852; product, locomotive and car axles, forgings, iron shafting, etc.—*Dismantled in 1902.*

Coxey Steel and Silica Sand Company, James Israel, Receiver, Mount Vernon, Knox county. Built in 1900–1; two 4-pot crucible steel-melting furnaces; product, crucible steel castings.—*Crucible furnaces only abandoned. Now equipped to make open-hearth steel, brass, bronze, and gray iron castings.* *See page 323.*

Heckert-Baltzley Billet Company, Findlay, Hancock county. Built in 1888 and enlarged in 1891; remodeled in 1895; equipped with basic open-hearth steel furnaces and trains of rolls; product, seamless steel tubing, steel castings, etc.—*Dismantled in 1903.*

Lima (The) Steel Casting Company, Lima. Built in 1892 and first put in operation in October, 1892; 2 acid open-hearth steel furnaces; product, steel castings.—*Destroyed by fire in February, 1902.*

Pomeroy Mill, American Steel Hoop Company, Pittsburgh. Works at Pomeroy, Meigs county, Ohio. Built in 1847; product, refined iron and soft steel bars, bands, and horseshoe bars.—*Dismantled.*

Reeves Works, American Tin Plate Company, New York. Works at Canal Dover, Ohio. Built in 1895; product, black plates for tinning and black steel sheets.—*Dismantled in 1901.*

Russia Works, American Sheet Steel Company, New York. Works at Niles, Trumbull county. Built in 1864; product, iron and steel skelp, sheet iron, and sheet steel. (Formerly called the Russia Sheet Iron Mills.)—*Dismantled in 1902.*

Youngstown (The) Engineering Company, Youngstown. Contemplated erecting a plant at Youngstown for the manufacture of Tropenas or open-hearth steel castings.—*Project abandoned.*

INDIANA.

BLAST FURNACES.

Brazil Furnace, Brazil, Clay county. One stack, 60 x 13, built in 1867, blown in in December, 1867, and remodeled in 1872; fuel, raw block coal and coke.—*Dismantled.*

Vigo Furnace, Terre Haute. One stack, 62½ x 13, built in 1872 and blown in in 1873; rebuilt in 1889; fuel, raw coal.—*Dismantled.*

ROLLING MILLS AND STEEL WORKS.

Atlanta Works, American Tin Plate Company, New York. Works at Atlanta, Hamilton county, Indiana. Built in 1894–5 and put in operation in March, 1895; product, black plates for tinning and light sheets.—*Dismantled in 1902–3.*

Central Steel Company, 227 West Merrill street, Indianapolis, Marion county. Built in 1857, 1881–2, and 1886–7; remodeled in 1890–1; equipped with basic open-hearth steel furnaces, basic-Bessemer converters, and trains of rolls; product, billets, angles, etc.—*Dismantled with the exception of one 26-inch beam mill, which is idle and for sale.* *See page 330.*

Chicago Steel Manufacturing Company, Hammond, Lake county. Built in 1886–7; formerly equipped with two 5-gross-ton Bessemer steel converters, which made their first blow November 22, 1887, and which were dismantled in 1902, and 2 trains of rolls; product, shovel and nail plate, iron and steel cut nails, pressed steel specialties, and shovels, spades, and scoops.—*Almost entirely destroyed by fire in December, 1903. Now being rebuilt at New Castle, Henry county, Indiana.* *See pages 330–31.*

Midland Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Muncie, Indiana. Built in 1892 and first put in operation in that year; one 30-gross-ton basic and one 30-gross-ton acid open-hearth steel furnace; product, ingots.—*Open-hearth steel furnaces only dismantled in 1901. For a description of the remainder of the plant see page 57.*

National Rolling Mill Company, Hartford City, Blackford county. Built in 1901 and first put in operation September 30, 1901; product, muck bar and finished bar iron.—*Dismantled in 1903–4 and machinery re-erected at Vincennes, Indiana. See page 334.*

New Albany Works, Republic Iron and Steel Company, Chicago. Works at New Albany, Floyd county, Indiana. Forge built in 1869; rolling mill added in October, 1887; product, car axles, shafting, forgings, and bar and structural iron.—*Dismantled.*

ILLINOIS.

BLAST FURNACES.

Big Muddy Furnace, Grand Tower, Jackson county. One stack, 69 x 17, built in 1871; fuel, coke.—*Dismantled.*

ROLLING MILLS AND STEEL WORKS.

American Can Company, Bowling Green Building, New York City. Works at Maywood, Cook county, Illinois. One 6-gross-ton acid open-hearth steel furnace erected in 1890–1; plant also equipped with machinery for the production of steel sheets from fluid metal.—*Dismantled about 1897.*

Chicago Tin Plate and Can Company, Chicago. Contemplated erecting works at Chicago for the manufacture of black plates and sheets.—*Project abandoned.*

Chicago Works, American Steel Foundries, New York. Works at Fifty-ninth and Wallace streets, Chicago. Open-hearth steel plant built in 1892; two Siemens acid furnaces (one 15 and one 20-gross-ton); first steel made September 17, 1892; product, draw bars, knuckles, car wheels, automatic couplers, and general castings. (Formerly operated by the Sargent Company.)—*Dismantled in 1903–4 and machinery, etc., used in equipping the Indiana Harbor Works of the company at Indiana Harbor, Indiana. See pages 95–6.*

Great Western Works, American Tin Plate Company, New York. Works at Joliet, Will county, Illinois. Built in 1891–2 and first put in operation May 1, 1892; product, black plates for tinning.—*Dismantled in 1901–2.*

Hercules (The) Steel Casting Company, Harvey, Cook county. Works for the manufacture of steel by a special process built in 1899; product, castings.—*Steel furnaces dismantled.*

Plano Steel Works, Albert H. Sears, Plano, Kendall county. First put in operation January 1, 1885; product, steel shapes for agricultural implements.—*Dismantled in 1899.*

Sargent (The) Company, Old Colony Building, Chicago. Works at Fifty-ninth and Wallace streets, Chicago. Crucible steel department built in 1890; one 24-pot Siemens steel-melting furnace; first crucible steel made February 13, 1891; product, brake shoe inserts and general castings.—*Crucible furnace removed in 1901 to the company's works at Chicago Heights, which are now operated by the American Brake Shoe and Foundry Company. See page 162.*

Springfield Works, Republic Iron and Steel Company, Chicago. Works at Springfield, Sangamon county, Illinois. Open-hearth steel works built in 1879; two 20-gross-ton Siemens-Pernot acid furnaces and one Pernot furnace for dephosphorizing pig metal; first steel ingots made February 9, 1880.—*Pernot dephosphorizing and open-hearth furnaces only dismantled. For a description of the remainder of the plant see page 87.*

Union Works, The Illinois Steel Company, Chicago. Works at 3179 Ashland ave., Chicago. Original mill built in 1863 and original Bessemer steel converters made first blow on July 26, 1871; Bessemer steel works and rail mill rebuilt in 1885–6; two 10-gross-ton converters and plant for rails and billets.—*Dismantled in 1902–3.*

Valley Steel Works, Ernest E. Wangelin, Belleville, St. Clair county, Illinois. Built in 1882 and remodeled in 1885–6; product, steel cut nails and large flats.—*Dismantled in 1901.*

MICHIGAN.

BLAST FURNACES.

Eureka Furnaces, Eureka Iron and Steel Works, Detroit. Furnaces at Wyandotte. Two stacks: one stack, 45 x 9, built in 1863, formerly known as Ward Furnace; the other stack, 55 x 11, built in 1855, rebuilt in 1884–5, and remodeled since. Fuel, charcoal.—*Ward Furnace dismantled in 1898; the other in 1903.*

Excelsior Furnace, Pioneer Iron Company, Cleveland, Ohio. Furnace at Ishpeming, Marquette county, Michigan. One stack, 50 x 10, built in 1872, burned and rebuilt in 1880, and again rebuilt in 1890; fuel, charcoal.—*Dismantled.*

Gaylord Iron Company, Detroit, Wayne county. One stack, 56 x 9½, built in 1856 and first put in blast March 16, 1857; remodeled in 1889; fuel, charcoal.—*Dismantled in 1901.*

Grace Furnace, Marquette. One stack, 63 x 17, built in 1872; fuel, mixed anthracite and bituminous coal.—*Dismantled.*

Martel Furnace, St. Ignace, Mackinac county. One stack, 53 x 11½,

first put in blast August 15, 1881; idle for several years; revived in 1902–3 and again blown in in January, 1903, by M. A. Hanna & Co., lessees; fuel, charcoal; product, car-wheel pig iron; partly destroyed by fire in April, 1903.—*Dismantled and machinery used in equipping the new furnace of the Boyne City Charcoal Iron Company, at Boyne City, Michigan. See page 342.*

ROLLING MILLS AND STEEL WORKS.

American Rolling Mill Corporation, Rookery Building, Chicago, Ill. Works at Muskegon, Muskegon county, Mich. Built and put in operation in 1890; equipped with one open-hearth steel furnace and 3 trains of rolls; first steel made in June, 1900; product, steel ingots, muck bar, and bar iron.—*Dismantled in 1903 and machinery used in equipping the rolling mill of the Fort Wayne Iron and Steel Company, at Fort Wayne, Indiana. See pages 331–32. Open-hearth furnace permanently abandoned and dismantled.*

Muskegon Works, American Tin Plate Company, New York. Works at Muskegon, Muskegon county, Michigan. Black plate mill added to rolling mill in 1899 and first black plates made in 1900; product, iron and steel black plates for tinning.—*Dismantled in 1903.*

MINNESOTA.

ROLLING MILLS AND STEEL WORKS.

Duluth Car Works, Metropolitan Life Insurance Company, owners, New York. Works at Duluth, St. Louis county, Minnesota. Built in 1888–9 and put in operation in October, 1889; 4 heating furnaces, 5 gas producers, 2 trains of rolls, (10 and 18-inch,) and one 6,000-lb. and two 3,000-lb. hammers; product, bar iron, rods, bolts, and forgings; annual capacity, 11,000 tons of rolled iron and 4,500 tons of forgings. Fuel, coal. A car-wheel plant, a car-axle plant, and a carbuilding plant are connected with the works. O. H. Simonds, Agent, Duluth.—*Idle and for sale or lease.*

Ironton Structural Steel Works, Duluth, St. Louis county. Built in 1892–3; 2 gas heating furnaces and two 30-inch trains of rolls. One 20-gross-ton acid open-hearth steel furnace erected in 1895; first steel made in June, 1895; annual capacity, 10,000 tons. Product, structural steel; annual capacity, 35,000 tons. Fuel, coal and manufactured gas. (Owned by the Estate of John E. Searles; George D. Beatty, Receiver, 27 William st., New York; O. H. Simonds, Agent, Duluth.)—*Idle and for sale.*

Minnesota Iron Works, Republic Iron and Steel Company, Chicago. Works at Columbia Heights, Anoka county, Minnesota. Rolling mill built in 1894–5; steel department added in 1898 and first steel made in January, 1899; one 22-gross-ton and two 15-gross-

ton basic open-hearth steel furnaces; product, bar iron and open-hearth steel bars and shapes.—*Open-hearth furnaces dismantled. The rolling mill is not in operation.* *See page 86.*

MISSOURI.

ROLLING MILLS AND STEEL WORKS.

St. Louis Iron and Steel Foundry Company, St. Louis. Two 2-gross-ton Tropenas steel converters added to an iron foundry in 1901; product, steel castings.—*Burned early in 1902 and not rebuilt.*

St. Louis Steam Forge and Iron Works, St. Louis. Built in 1862; destroyed by fire in March, 1901, and rebuilt in that year; product, bar iron, car axles, and forgings of iron or steel.—*Dismantled in 1902 and machinery utilized in part in equipping the new works of the company at East St. Louis, Illinois.* *See pages 339–40.*

WASHINGTON.

ROLLING MILLS AND STEEL WORKS.

Pacific (The) Steel Company, Irondale, (via Port Townsend,) Jefferson county. Contemplated erecting a rolling mill and an open-hearth steel plant at Irondale.—*Project abandoned for the present.*

CALIFORNIA.

ROLLING MILLS.

Pacific Iron and Nail Company, Oakland. Commenced work May 1, 1883; product, muck bar, nail plates, etc.—*Dismantled in 1899.*

UNITED STATES.

Since November, 1901, 21 blast furnaces which were then enumerated in the active list have 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, or 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 2 forges and bloomaries have been similarly treated.

From June, 1898, to November, 1901, 61 blast furnaces had been dismantled, abandoned, or transferred to the inactive list. During the same period 118 rolling mills, Bessemer steel plants, open-hearth steel plants, crucible steel plants, or plants equipped for the manufacture of steel by special processes had also been dismantled, abandoned, or transferred to the inactive list. In addition 5 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 forges and bloomaries, are classified according to their products. This classification is for ready reference only. In this classified list brief mention is also made of some works, not producers of iron and steel, which have not been mentioned or described in the preceding pages, as, for instance, tinplate and terne plate works that are not connected with rolling mills or steel works. Lists of the leading consumers of iron and steel in 1903—locomotive builders, shipbuilders, bridgebuilders, carbuilders, cast-iron pipe manufacturers, cut-nail and wire-nail manufacturers, etc., will be found in the Supplement to the edition of the Directory for 1901, issued in April, 1903.

BESSEMER STEEL WORKS.

This list includes all works which produce steel by the ordinary acid and basic Bessemer processes, the Clapp-Griffiths process, the Robert-Bessemer process, the Tropenas process, the Bookwalter process, the Evans-Wills process, and other Bessemer processes. A list of plants which produce Bessemer steel castings will be found beginning on page 394.

MASSACHUSETTS—2.

Tremont Nail Company, West Wareham. One 3-gross-ton Clapp-Griffiths converter.—*Idle.* *See page 192.*

Watertown Arsenal, Watertown. One 2-gross-ton Tropenas steel converter, used for steel castings only.—*See page 192.*

RHODE ISLAND—1.

Providence Steel Casting Company, Providence. Two 2-gross-ton Tropenas steel converters; steel castings.—*See page 193.*

NEW YORK—3 COMPLETED AND 1 PROJECTED.

Breaker Island Works, American Steel and Wire Company of New

Jersey, Chicago. Works on Breaker Island, opposite Troy, N. Y. Three 15-gross-ton basic converters.—*Idle. See page 43.*

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. Contemplates erecting one 2-gross-ton Tropenas steel converter, to be used for steel castings only.—*See page 204.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. One 2-gross-ton Tropenas converter, used for steel castings only.—*See page 202.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna. Four 10-gross-ton acid converters. —*See page 101.*

NEW JERSEY—2.

Atha (Benjamin) & Co., Newark. Three 1½-gross-ton top-blown acid converters, used for steel castings only.—*See page 207.*

New Jersey Steel Company, Rahway. Two 4,000-pound Evans-Wills converters, used for steel castings only.—*See page 209.*

PENNSYLVANIA—15.

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Three 10-gross-ton acid converters.—*See page 139.*

American Steel and Wire Company of New Jersey, Chicago. Two Bessemer steel works in Pittsburgh: Shoenberger Works; two 7-gross-ton acid converters. Twenty-sixth Street Works; two 5-gross-ton acid converters.—*See pages 45-6.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. Two 2-gross-ton tilting acid converters.—*Idle. See page 221.*

Brylgon Steel Casting Company, Reading. One 2-gross-ton Bookwalter converter, used for steel castings only.—*See page 221. Erecting a new plant at New Castle, Delaware. See page 274.*

Cambria Steel Company, Philadelphia. Works at Johnstown, Pa. Four 12½-gross-ton acid converters.—*See page 136.*

Carnegie Steel Company, Pittsburgh. Four Bessemer steel works in Pennsylvania: Duquesne Steel Works, Cochran; two 10-gross-ton acid converters. Edgar Thomson Steel Works, Bessemer; four 15-gross-ton acid converters. Homestead Steel Works, Munhall; two 10-gross-ton acid converters. New Castle Steel Works, New Castle; two 8-gross-ton acid converters.—*See pages 11, 12, and 14.*

Logan Manufacturing Company, Phœnixville. Two 2-gross-ton Tropenas converters; steel castings.—*Idle. See page 225.*

Monongahela Steel Works, (National Department,) National Tube Company, Pittsburgh. Works at McKeesport. Two 8-gross-ton acid converters.—*See page 35.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Three 10-gross-ton acid converters.—*See page 119.*

Pottstown Iron Works, Glasgow Iron Company, Pottstown, Montgomery county. Three 10-gross-ton basic converters.—*Idle. May be dismantled. See page 127.*

Wharton, Jr., (William) & Co., Incorporated, Philadelphia. One 2-gross-ton Tropenas converter; steel castings.—*See page 214.*

DELAWARE—1 BUILDING.

Brylgon Steel Casting Company, New Castle. Building two 2-gross-ton Bookwalter converters for steel castings only. Two additional 5-gross-ton Bookwalter steel converters may be built.—*See page 274. The company also owns a steel-casting plant at Reading, Pa., which is to be dismantled. See page 221.*

MARYLAND—1.

Maryland Steel Company; general offices, Sparrows Point, Maryland, and Girard Building, Philadelphia. Works at Sparrows Point. Three 18-gross-ton acid converters.—*See page 121.*

DISTRICT OF COLUMBIA—1.

Naval Gun Factory, United States Navy Yard, Washington. One 2-gross-ton Tropenas converter; steel castings.—*See page 278.*

VIRGINIA—2.

Newport News Shipbuilding and Dry Dock Company, New York. Works at Newport News, Virginia. One 2-gross-ton Tropenas converter; steel castings.—*See page 283.*

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. Two 3-gross-ton acid converters.—*Converters idle since 1888. See page 283.*

WEST VIRGINIA—2.

Riverside Steel Works, (Riverside Department,) National Tube Company, Pittsburgh. Works at Benwood, West Virginia. Two 5-gross-ton acid converters.—*See page 36.*

Wheeling Steel Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood. Two 6-ton acid converters.—*See page 154.*

KENTUCKY—1.

Ashland Steel Company, Incorporated, Ashland, Boyd county. Two 5½-gross-ton acid converters.—*For description see page 289.*

ALABAMA—1.

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley. One 15-gross-ton converter for desiliconizing and decarburizing molten metal for the open-hearth steel furnaces of the company.—*See page 182.*

OHIO—8 COMPLETED AND 2 PROJECTED.

Bessemer Plant, Republic Iron and Steel Company, Chicago. Works at Youngstown. Two 6-gross-ton acid converters.—*See page 85.*

Carnegie Steel Company, Pittsburgh. Four Bessemer steel works in Ohio: Bellaire Steel Works, Bellaire; two 10-gross-ton acid converters. Columbus Steel Works, Columbus; two 4½-gross-ton acid converters. Mingo Steel Works, Mingo Junction; two 10-gross-ton acid converters. Ohio Steel Works, Youngstown; two 10-gross-ton acid converters.—*See pages 10, 13, and 14.*

Lorain Works, The National Tube Company, (of Ohio,) Lorain. Two 10-gross-ton acid converters.—*See page 32.*

Marion (The) Steam Shovel Company, Marion. One 1½-gross-ton Robert-Bessemer converter; steel castings, all consumed by the company.—*See page 325.*

Menough (The) Foundry Company, Incorporated, Wellsville. May erect a small Bessemer converter in the summer or fall of 1904 for the manufacture of steel castings.—*See page 329.*

National (The) Steel Castings Company, Williamson Building, Cleveland. Contemplates building at Ravenna one 2-gross-ton Tropenas steel converter to manufacture steel castings.—*See page 327.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Rookery Building, Chicago. Works at Newburgh, Cuyahoga county, Ohio. Two 10-gross-ton acid converters.—*See page 44.*

ILLINOIS—4.

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, N. J. Works at Chicago Heights. Three 2-gross-ton Tropenas converters; steel castings.—*See page 162.*

Illinois (The) Steel Company, Chicago. Two Bessemer steel works in Illinois: Joliet Works, Joliet; two 10-gross-ton acid converters. South Works, South Chicago; three 15-gross-ton acid converters. —*See pages 28–9.*

South Chicago Works, International Harvester Company, No. 7 Monroe street, Chicago. Works at South Chicago, (Station S.) Two 10-gross-ton acid converters.—*For description see page 160.*

MICHIGAN—1.

Detroit (The) Steel Casting Company, Detroit. Two 1½-gross-ton Robert-Bessemer converters; steel castings.—*See page 344.*

WISCONSIN—3.

Milwaukee Steel Foundry Company, Milwaukee. One 1-gross-ton special steel converter; steel castings.—*See page 348.*

Smith (George H.) Steel Casting Company, Milwaukee. Two 2-gross-ton special converters; steel castings.—*See page 348.*

West Superior Branch, United States Cast Iron Pipe and Foundry Company, New York. Works at West Superior, Wis. Two 4-gross-ton acid converters.—*Idle and for sale or lease.* *See page 349.*

MINNESOTA—1.

American Hoist and Derrick Company, St. Paul. One 2-gross-ton Tropenas converter, used for steel castings only.—*See page 350.*

COLORADO—1 COMPLETED AND 1 PROJECTED.

Denver (The) Steel Casting Company, Denver. May erect at South Denver two 2-gross-ton converters for the manufacture of steel castings.—*See page 353.*

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Boston Building, Denver. Works at Pueblo, Pueblo county. Two 15-gross-ton acid converters.—*See page 171.*

OREGON—1.

Columbia Engineering Works, Incorporated, Portland. One 2-gross-ton surface-blown converter; steel castings.—*See page 355.*

CALIFORNIA—1.

Union Iron Works, San Francisco. Works in the Potrero. One 2-gross-ton Tropenas converter; steel castings. Controlled by the United States Shipbuilding Company.—*See page 93.*

UNITED STATES.

Total number of Bessemer steel works in the United States in June, 1904: 51 completed, one building, and 4 projected. Of the completed works 32 are standard Bessemer plants with 75 converters, one is a Clapp-Griffiths plant with one converter, 2 are Robert-Bessemer plants with 3 converters, 10 are Tropenas plants with 14 converters, one is a Bookwalter plant with one converter, one is an Evans-Wills plant with 2 converters, and 4 plants with 7 converters make steel by special processes. Total number of completed converters: 103. In addition one Bookwalter plant with 2 converters is being built and the same plant may erect 2 additional Bookwalter converters, and 2 Tropenas plants with 2 converters and 2 Bessemer plants with 3 converters to make steel castings are projected.

Total in November, 1901: 47 completed, one building, and 2 projected. Of the completed works 35 were standard Bessemer plants with 81 converters, one was a Clapp-Griffiths plant with one converter, 2 were Robert-Bessemer plants with 3 converters, 8 were Tropenas plants with 13 converters, and one plant with 2 converters made steel by a special process. Total converters: 100.

OPEN-HEARTH STEEL WORKS.

A list of plants equipped for the manufacture of open-hearth steel castings will be found beginning on page 394. The capacities of the open-hearth steel furnaces here mentioned are given in gross tons of 2,240 pounds.

MASSACHUSETTS—4.

South Works, American Steel and Wire Company of New Jersey, Chicago. Works at Worcester, Mass. One 15 and three 20-gross-ton stationary furnaces and four 50-gross-ton rolling furnaces, (5 acid and 3 basic.)—*See page 45.*

Thomson-Houston Electric Company, Steel Foundry Department, Lynn. (Operating for the General Electric Company; general office, Schenectady, New York.) Three 15-gross-ton acid furnaces; steel castings.—*See page 191.*

Tremont Nail Company, West Wareham. One 20-gross-ton basic furnace. An additional 50-gross-ton basic furnace may be erected.—*See page 192.*

United States Steel Company, Everett, Middlesex county. Two 15-gross-ton acid furnaces; steel castings.—*See page 192.*

RHODE ISLAND—1.

Phillipsdale Plant, Washburn Wire Company, Phillipsdale. Two 15-gross-ton tilting furnaces, (one acid and one basic.)—*See page 193.*

CONNECTICUT—3.

American (The) Tube and Stamping Company, Bridgeport. Three 40-gross-ton basic furnaces.—*See page 194.*

Malleable Iron Fittings Company, Branford. One 20-gross-ton acid furnace; steel castings.—*See page 195.*

National Steel Foundry Company, New Haven. Two 25-gross-ton Siemens acid furnaces, used for steel castings only. Controlled by the National Steel and Wire Company.—*See page 99.*

NEW YORK—8 COMPLETED AND 1 PROJECTED.

Astoria Steel Company, Calby M. Chester, Jr., Receiver, 44 Pine st., New York. Works at Astoria. Two 25-gross-ton basic furnaces, used for steel castings only.—*See page 199.*

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo. Two 15-gross-ton acid furnaces; steel castings.—*See page 200.*

Elmira Steel Works, E. B. Leaf & Co., Real Estate Trust Building, Philadelphia. Works at Elmira, New York. Two 20-gross-ton basic furnaces.—*Idle and for sale or lease. See page 201.*

Gould Coupler Company's Steel Plant, Gould Coupler Company, Depew, New York, and No. 1 West Thirty-fourth st., New York. Works at Depew. Two 20-net-ton basic furnaces, with provision for two additional furnaces; used for the manufacture of steel castings only.—*See page 201.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. One 10 and two 8-gross-ton acid furnaces; steel castings.—*See page 202.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna. Six 60-gross-ton Siemens basic furnaces.—*See pages 101-2.*

Onondaga Steel Works, Sweet's Steel Company, Syracuse. One 12-gross-ton basic furnace.—*To be dismantled. See page 202. The company is erecting a new plant at Newberry, Pa. See page 234.*

Osborne (D. M.) & Co., Auburn. Contemplate erecting two 15-gross-ton basic furnaces.—*See page 203.*

Wickwire Brothers, Cortland, Cortland county. Two 30-gross-ton Wellman basic open-hearth steel furnaces.—*See page 204.*

NEW JERSEY—5 COMPLETED AND 1 BUILDING.

Atha (Benjamin) & Co., Newark. Two furnaces (one 15-gross-ton acid and one 15-gross-ton basic); steel castings.—*See page 207.*

Chrome Steel Works, Chrome. Telegraph address, Carteret. Two 15-gross-ton Siemens acid furnaces.—*See page 207.*

Delawanna Foundry, The Cooper, Wigand, Cooke Company, New York. Works at Delawanna, New Jersey. One 20-gross-ton basic furnace.—*See page 208.*

New Jersey Steel Company, Rahway. Building one 20-gross-ton acid furnace; steel castings.—*See page 209.*

Pardee (The C.) Works, Incorporated, Perth Amboy. Two 25-gross-ton basic furnaces.—*See page 209.*

Passaic Steel Company, Paterson. Seven furnaces, (two 50 and four 25-gross-ton basic and one 25-gross-ton acid.)—*See page 209.*

PENNSYLVANIA—67 COMPLETED, 1 BUILDING, 1 PARTLY ERECTED, AND 5 PROJECTED.

Allegheny Steel and Iron Company, Pittsburgh. Works at Avenue. Two 45-gross-ton basic furnaces.—*See page 247.*

Altoona Foundry and Machine Company, Altoona. One 10-gross-ton Swindell acid furnace; product, malleable castings, but steel castings could be made.—*Open-hearth furnace idle. See page 242.*

Ambridge Plant, American Bridge Company, Pittsburgh. Contemplates erecting at Ambridge one 15-gross-ton acid furnace for the manufacture of steel castings.—*See page 66.*

American Sheet and Tin Plate Company, Pittsburgh. Two open-

hearth steel plants in Pennsylvania. Vandergrift Works, Vandergrift; eight 30-gross-ton acid furnaces. Wood's Works, McKeesport; two 15-gross-ton acid furnaces.—*See pages 60–1.*

American Steel Foundries, New York. Four open-hearth steel plants in Pennsylvania which make steel castings only. Franklin Works, Franklin; two 15-gross-ton Siemens acid furnaces. Pittsburgh Works, Pittsburgh; one 10-gross-ton acid furnace. Sharon Works, Sharon; one 20 and two 25-gross-ton acid furnaces. Thurlow Works, Thurlow; two 12 and two 20-gross-ton acid furnaces.—*See pages 95–6.*

Bethlehem Steel Company, South Bethlehem. 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.) Controlled by the United States Shipbuilding Company.—*See page 91.*

Brandywine Rolling Mills, Worth Brothers Company, Coatesville. One 35-gross-ton acid and five 35 and four 50-gross-ton basic furnaces.—*See page 130.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Fourteen furnaces, (one 20 and one 50-gross-ton acid and three 20 and nine 50-gross-ton basic.) Adding five 50-gross-ton basic furnaces.—*See page 136.*

Carbon Steel Company, Pittsburgh. Eight 50-gross-ton furnaces, (5 acid and 3 basic.)—*See page 248.*

Carnegie Steel Company, Pittsburgh. Five open-hearth steel plants in Pennsylvania. Donora Steel Works, Donora; twelve 50-gross-ton basic furnaces. Duquesne Steel Works, Cochran; fourteen 50-gross-ton basic furnaces. Homestead Steel Works, Munhall; 50 basic furnaces, (three 20, twenty-three 40, and twenty-four 45-gross-ton.) Sharon Steel Works, Sharon; six 40-gross-ton basic furnaces. South Sharon Works, Sharon; twelve 50-gross-ton basic furnaces; 5 additional 50-gross-ton basic furnaces are projected.—*See pages 10–15.*

Chester Steel Castings Company, Philadelphia. Works at Chester. One 20 and one 30-gross-ton acid furnace; steel castings.—*See page 228.*

Clairton Steel Works, Clairton Steel Company, Pittsburgh. Works at Clairton. Twelve 50-gross-ton Siemens furnaces, (one acid and 11 basic.)—*See page 71.*

Columbia Iron and Steel Foundry, W. J. Carlin Company, Pittsburgh. One 9-gross-ton acid furnace; steel castings.—*Idle and for sale or lease. May be dismantled. See page 249.*

Crucible Steel Company of America, Pittsburgh. Seven open-hearth steel works in Pennsylvania. Aliquippa Steel Works, Aliquippa; one 15-gross-ton acid furnace. Black Diamond Steel Works, (op-

erated by the Park Steel Company,) Pittsburgh; two 18 and three 30-gross-ton acid and one 50 and two 30-gross-ton basic furnaces. Crescent Steel Works, Pittsburgh; two 15-gross-ton special open-hearth furnaces. Howe, Brown & Co. Works, Pittsburgh; one 15 and one 20-gross-ton acid furnace. La Belle Steel Works, Allegheny; two 15-gross-ton acid furnaces. Pittsburgh Steel Works, McKees Rocks; one 20-gross-ton acid furnace. Singer, Nimick & Co. Works, Pittsburgh; one idle 10-gross-ton acid furnace.—*See pages 144–47.*

Damascus Nickel Steel Company, Philadelphia. Works at Carnegie. One 10-gross-ton acid furnace.—*See page 249.*

Danville Bessemer Company, Philadelphia. Works at Danville. One 10-gross-ton acid furnace.—*Idle and for sale. See page 231.*

Delaware River Steel Casting Company, Chester. Two 35-gross-ton acid furnaces; steel castings.—*See page 228.*

Diamond Drill and Machine Company, Birdsboro. Two acid furnaces (20 and 25-gross-ton); steel castings.—*See page 222.*

Duncan Chemical Company, Washington. One 15-gross-ton acid furnace; steel castings.—*Idle and for sale. See page 267.*

Duquesne Steel Foundry Company, Pittsburgh. Works at Kendall Station. Two 25-gross-ton acid furnaces; steel castings.—*See page 249.*

Eastern (The) Steel Company, Pottsville. Four 50-gross-ton basic furnaces.—*See page 223.*

Eddystone Engineering Works, Tindel-Morris Company, Eddystone. May erect an acid open-hearth steel furnace.—*See page 230.*

Eleanor (The) Iron and Steel Company commenced the erection of an open-hearth steel plant at Butler in the summer of 1903; foundations for furnaces built; work suspended.—*See page 273.*

Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Two 10-gross-ton acid furnaces; steel castings.—*See page 250.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Three 40-gross-ton Siemens basic furnaces.—*See page 237.*

Ivy Rock Steel Works, Alan Wood Iron and Steel Company, 519 Arch st., Philadelphia. Works at Ivy Rock, near Conshohocken. Five 50-gross-ton Siemens basic furnaces.—*See page 131.*

Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown. One 5 and one 10-gross-ton acid furnace; steel castings.—*See page 33.*

Jones and Laughlin Steel Company, Pittsburgh. Two open-hearth steel plants in Pittsburgh. American Iron and Steel Works; one 25-gross-ton acid and one 250 and six 40-gross-ton basic furnaces. Soho Department; one 15 and three 25-gross-ton acid furnaces. —*See pages 138–39.*

Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons Iron and Steel Works, Tacony, Philadelphia. One 10-gross-ton basic furnace.—*See page 113.*

Latrobe Steel Company, Philadelphia. Works at Latrobe. One 30 and two 20-gross-ton acid furnaces.—*See page 269.*

Lebanon Iron and Steel Company, Lebanon. One 40-gross-ton basic furnace. An additional 40-gross-ton basic furnace is projected.—*See page 238.*

Lukens Iron and Steel Company, Coatesville. One 40-gross-ton acid and five 40 and six 50-gross-ton basic furnaces.—*See page 133.*

McConway (The) and Torley Company, Pittsburgh. One 25 and two 15-gross-ton acid furnaces; steel castings. An additional 15-gross-ton acid furnace is being erected.—*See page 252.*

Mesta Machine Company, Pittsburgh. Works at Homestead. One 25-gross-ton acid furnace; steel castings. May add one 30-gross-ton basic furnace.—*See page 252.*

Midvale (The) Steel Company, Nicetown, Philadelphia. Makes acid and basic open-hearth steel.—*See page 214.*

Monessen Plant, Page Woven Wire Fence Company, Monessen. Two 15-gross-ton Wellman basic furnaces.—*See page 270.*

Monessen Works, Pittsburgh Steel Company, Pittsburgh. Works at Monessen. Contemplate erecting several basic open-hearth furnaces.—*See page 142.*

National (The) Malleable Castings Company, Sharon. General office, Cleveland, Ohio. Seven acid furnaces; steel castings—*See page 261.*

Norway Iron and Steel Company, York. One 10-gross-ton acid furnace for steel castings.—*See page 238.*

Open Hearth Steel Works, Central Iron and Steel Company, Harrisburg. Four 50-gross-ton basic furnaces.—*See page 134.*

Pencoyd Iron Works, A. and P. Roberts Company, operators, Philadelphia. Works in Montgomery county, opposite Manayunk. One 75-gross-ton and ten 30-gross-ton basic furnaces. Controlled by the American Bridge Company.—*See page 66.*

Penn Steel Casting and Machine Company, Chester. Three 30-gross-ton acid furnaces; steel castings.—*See page 229.*

Pennsylvania Malleable Company, Pittsburgh. Works at McKees Rocks. Four 15-gross-ton Swindell & Smythe acid furnaces; steel castings.—*See page 253.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Nine basic furnaces (two 15, two 30, and five 45-gross-ton) and five acid furnaces, (one 10, one 20, and three 45-gross-ton.) —*See page 119.*

Phœnix (The) Iron Company, Philadelphia. Works at Phœnixville.

One 30 and one 40-gross-ton acid and three 30 and three 40-gross-ton basic furnaces.—*See page 116.*

Pittsburgh Seamless Tube Company, Pittsburgh. Works at Morado Station, Pittsburgh, Fort Wayne, and Chicago Railway. Two open-hearth furnaces projected.—*See page 262.*

Pittsburgh Steel Foundry, Pittsburgh. Works at Glassport. Five 20-gross-ton furnaces (2 basic and 3 acid); steel castings.—*See page 254.*

Schoen Steel Wheel Company, Pittsburgh. Works at McKees Rocks. Contemplates erecting several acid open-hearth steel furnaces in 1904.—*See page 255.*

Seaboard Steel Casting Company, Chester. One 25 and two 20-gross-ton acid furnaces; steel castings.—*See page 229.*

Sharon Steel Hoop Company, Sharon. Four 25-gross-ton Swindell basic furnaces.—*See page 262.*

Shoenberger Works, American Steel and Wire Company of New Jersey, Chicago. Works at Pittsburgh. Three 35-gross-ton basic furnaces.—*See page 45.*

Solid Steel Casting Company, Chester. Works at Lamokin, one mile south of Chester. Two 20-gross-ton acid furnaces; steel castings.—*See page 229.*

Standard (The) Steel Works, Philadelphia. Works at Burnham. Four Wellman revolving acid furnaces, (two 15, one 20, and one 50-gross-ton.)—*See page 244.*

Sterling Steel Foundry Company, Pittsburgh. Works at Braddock. Two 20-gross-ton acid furnaces; steel castings.—*See page 255.*

Sweet's Steel Company, Williamsport. Building works at Newberry, near Williamsport, to be equipped with three 12-gross-ton Siemens basic furnaces.—*See page 234.*

Tidewater Steel Company, Chester. Works at Thurlow Station. Three 35 and two 50-gross-ton basic furnaces.—*See page 230.*

Union Steel Casting Company, Pittsburgh. Two 25-gross-ton acid furnaces; steel castings.—*See page 256.*

United Engineering and Foundry Company, Pittsburgh. Works at Vandergrift. Two 15-gross-ton Swindell basic furnaces; steel castings.—*See page 272.*

Vulcan Crucible Steel Company, Aliquippa, Beaver county. One 10-gross-ton acid open-hearth steel furnace.—*See page 263.*

DELAWARE—2.

Baldt (The) Steel Company, New Castle. Three 25-gross-ton Siemens-Martin acid furnaces; steel castings.—*See page 274.*

Diamond (The) State Steel Company, Wilmington. Five 50-gross-ton Siemens furnaces, (4 basic and one acid.)—*See page 274.*

MARYLAND—1.

Taylor (N. and G.) Company, Philadelphia. Works at Cumberland, Maryland. Two 25-gross-ton basic furnaces.—*See page 277.*

WEST VIRGINIA—1 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Morgantown Tin Plate Company, Frank P. Corbin, Trustee, Morgantown. May erect several basic furnaces.—*For sale. See page 286.*

Ohio Valley Steel and Foundry Company, Robert Miller, Receiver, Pittsburgh. Building works at Paden City, West Virginia, to be equipped with 2 Siemens furnaces (one 20-gross-ton acid and one 25-gross-ton basic); steel castings.—*See page 286.*

West Virginia Malleable Iron Company, Point Pleasant. One 20-gross-ton acid furnace used for melting iron for malleable castings, but steel castings could be made.—*See page 287.*

KENTUCKY—1.

Watts Works, Virginia Iron, Coal, and Coke Company, Bristol, Tennessee. Works at Middlesborough, Kentucky. Seven 25-gross-ton basic furnaces, (4 completed and 3 partly completed.)—*Idle and not likely to resume operations soon. For description see page 176.*

TENNESSEE—1.

Southern (The) Steel Works, 610–14 Boyce street, Chattanooga. One 3-gross-ton acid furnace.—*For description see page 296.*

ALABAMA—5 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Birmingham Rolling Mills, (operated by the Birmingham Rolling Mill Company,) Birmingham. Two 30-gross-ton Siemens basic furnaces. Controlled by the Republic Iron and Steel Company, Chicago.—*See page 84.*

Birmingham Steel and Iron Company, Birmingham. Building one 10-gross-ton basic furnace for the manufacture of steel castings. —*Will probably be completed in September, 1904. See page 304.*

Gadsden Works, Alabama Steel and Wire Company, Birmingham. Works at Gadsden. Four 50-gross-ton basic furnaces.—*See page 303.*

Jefferson Steel Works, Union Iron and Steel Company, New York. Works at Birmingham, Alabama. One 15-gross-ton basic furnace. —*Idle and for sale or lease. See page 106.*

Sheffield Rolling Mill Company, Sheffield. May build two 25-gross-ton basic furnaces.—*See page 305.*

Tennessee Coal, Iron, and Railroad Company, Birmingham. Two open-hearth steel plants at Ensley, Alabama. Steel Casting Department; one 10-gross-ton basic furnace; steel castings. Steel Works Division; ten 50-gross-ton basic furnaces, (9 tilting and one stationary.)—*See page 182.*

OHIO—16 COMPLETED, 1 PARTLY ERECTED, AND 3 PROJECTED.

Alliance Works, American Steel Foundries, New York. Works at Alliance, Ohio. Five 20-gross-ton basic furnaces; steel castings. —*See page 95.*

American (The) Rolling Mill Company, Middletown. Two basic furnaces, (one 35 and one 50-gross-ton.)—*See page 321.*

Buckeye (The) Steel Castings Company, Columbus. Three furnaces (one 12-gross-ton acid and two 20-gross-ton basic); steel castings. —*See page 322.*

Byesville Works, The United Sheet and Tin Plate Company, Marietta. One 50-gross-ton Siemens basic furnace partly erected at Byesville in 1903; work suspended.—*See page 150.*

Canton Steel Company, Canton. General office, Pittsburgh. One 15 and two 10-gross-ton acid furnaces.—*See page 322.*

Cleveland (The) Steel Casting Company, Cleveland. Two acid furnaces (one 15 and one 25-gross-ton); steel castings.—*See page 313.*

Columbus (The) Malleable Iron Company, Columbus. Two acid furnaces (one 10 and one 25-gross-ton); product, malleable iron castings, but can make steel castings.—*See page 323.*

Coxey Steel and Silica Sand Company, James Israel, Receiver, Mount Vernon. Two Siemens acid furnaces (one 15 and one 25-gross-ton); steel castings.—*See page 323.*

Dithridge Steel Car Company, 76 Montgomery st., Jersey City, New Jersey. Contemplates erecting a basic open-hearth steel-casting plant at White City, near Newcomerstown, Ohio.—*See page 327.*

Menough (The) Foundry Company, Incorporated, Wellsville. Now makes light and heavy gray iron castings; may add one 10-gross-ton basic furnace for steel castings.—*See page 329.*

Newark Iron and Steel Company, William E. Miller, Receiver, Newark. One 10-gross-ton acid furnace; steel castings.—*See page 325.*

Newburgh Steel Works, American Steel and Wire Company of New Jersey, Chicago. Works at Newburgh, Ohio. One stationary and 4 rolling 50-gross-ton furnaces, (2 acid and 3 basic.)—*See page 44.*

Norwalk Steel and Iron Company, (Incorporated,) Norwalk. One 13-gross-ton modified basic furnace.—*See page 325.*

Otis (The) Steel Company, Limited, Cleveland. Ten furnaces, (two 10-gross-ton acid and five 18 and three 25-gross-ton basic.)—*See page 314.*

Portsmouth Steel Company, Wheeling, West Virginia. Works at Portsmouth, Ohio. Four 35-gross-ton furnaces, (one acid and 3 basic.)—*See page 319.*

Steubenville Works, La Belle Iron Works, Steubenville. Nine 50-gross-ton basic furnaces.—*See page 151.*

United (The) Steel Company, Canton. Three 45-gross-ton Siemens

furnaces, (one acid and two basic.) Three additional 45-gross-ton furnaces may be built.—*See page 326.*

Wellman-Seaver-Morgan (The) Company, Cleveland. One 20-gross-ton basic furnace; steel castings.—*See page 157.*

Youngstown (The) Iron and Steel Roofing Company, Youngstown. May erect an open-hearth steel plant.—*See page 310.*

Youngstown (The) Steel Casting Company, Youngstown. One 18-gross-ton Smythe acid furnace; steel castings.—*See page 311.*

INDIANA—6 COMPLETED AND 1 BUILDING.

Gould Steel Company, New York. Works at Anderson, Indiana. Two acid furnaces (one 12 and one 15-gross-ton); steel castings. —*See page 332.*

Indiana Harbor Works, American Steel Foundries, New York. Building works at Indiana Harbor, Ind., to be equipped with two 20-gross-ton Siemens furnaces (one acid and one basic) for the manufacture of steel castings.—*See page 95.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana. Four 50-gross-ton basic furnaces.—*See page 163.*

Matthews Steel Casting Company, Octave Jacqman, Receiver, Matthews. One 10-gross-ton Siemens acid furnace; steel castings. —*Idle and for sale. See page 333.*

National Car Coupler Company, Monadnock Block, Chicago. Works at Converse, Indiana. One 12-gross-ton acid furnace; steel castings.—*See page 334.*

National Steel Casting Company, Montpelier. Two 15-gross-ton acid furnaces; steel castings.—*See page 334.*

Peru Steel Casting Company, Peru. Two 20-gross-ton basic furnaces; steel castings.—*For description see page 335.*

ILLINOIS—8 COMPLETED AND 2 PROJECTED.

American Steel Foundries, New York. Two open-hearth steel plants in Illinois which make steel castings only. East St. Louis Works, East St. Louis; 5 Wellman-Seaver patent rolling basic furnaces, (four 15 and one 20-gross-ton.) Granite City Works, Granite City; five 20-gross-ton modified Siemens basic furnaces.—*See page 95.*

Chicago Malleable Castings Company, Chicago. Works at West Pullman. One 10-gross-ton Siemens basic furnace; steel castings. —*See page 336.*

Chicago Works, Grand Crossing Tack Company, Grand Crossing. Works at Chicago. Two 40-gross-ton Wellman stationary basic furnaces.—*See page 337.*

Commonwealth Steel Company, St. Louis, Missouri. Works at Granite City, Illinois. Four furnaces (one 25-gross-ton acid and

three 25-gross-ton basic); steel castings. An additional 25-gross-ton basic furnace is projected.—*See page 337.*

Granite City Rolling Mills, National Enameling and Stamping Company, 81–83 Fulton st., New York. Works at Granite City, Illinois. Basic open-hearth steel furnaces.—*See page 169.*

Melrose Park Works, Latrobe Steel and Coupler Company, Philadelphia. Works at Melrose Park, Ill. Two 30-gross-ton acid furnaces; steel castings.—*See page 339.*

St. Louis Steam Forge and Iron Works, East St. Louis. Contemplate erecting one 15-gross-ton acid and two 50-gross-ton basic furnaces.—*See page 339.*

South Chicago Works, International Harvester Company, Chicago. Works at South Chicago. May erect open-hearth steel furnaces. —*See page 160.*

South Works, The Illinois Steel Company, Chicago. Works at South Chicago. Ten basic furnaces, (four 50-gross-ton Wellman stationary and six 31-gross-ton Siemens.) Seven 50-gross-ton basic open-hearth furnaces are being added.—*See page 29.*

MICHIGAN—1 PROJECTED.

Michigan Steel Casting Company, Detroit. Contemplates erecting at Delray, Wayne county, four 25-gross-ton acid furnaces for the manufacture of ship, bridge, and other steel castings.—*See page 345.*

WISCONSIN—3.

Bay View Steel Casting Company, Milwaukee. One 1-gross-ton acid furnace; steel castings.—*See page 347.*

Dutcher (The J. A. and P. E.) Company, Milwaukee. One 3-gross-ton Wellman rotary acid furnace; steel castings.—*See page 347.*

Falk (The) Company, Milwaukee. One 15-gross-ton Wellman-Seaver acid furnace; steel castings. One 20-gross-ton basic open-hearth furnace may be added.—*For description see page 347.*

MISSOURI—1.

Scullin-Gallagher Iron and Steel Company, St. Louis. Five 20-gross-ton basic furnaces; steel castings.—*See page 352.*

COLORADO—1 COMPLETED AND 1 PROJECTED.

Denver (The) Steel Casting Company, Denver. Contemplates erecting at South Denver 2 Siemens furnaces (one 15-gross-ton acid and one 15-gross-ton basic) for the manufacture of steel castings. —*See page 353.*

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Six Siemens 50-gross-ton furnaces, (5 basic and one acid.)—*See page 172.*

WASHINGTON—1 PROJECTED.

Seattle Steel Company, Starr-Boyd Building, Seattle. Building a rolling mill at West Seattle, King county, which may be equipped with two 15-gross-ton open-hearth steel furnaces.—*See page 354.*

CALIFORNIA—1 COMPLETED AND 1 PROJECTED.

Abner Doble Company, San Francisco. Contemplates erecting an open-hearth steel plant in the Potrero, to be equipped with one 10-gross-ton basic Wellman rolling furnace for the manufacture of steel castings.—*See page 357.*

Pacific Jupiter Steel Company, San Francisco. Works at South San Francisco. One 10-gross-ton acid furnace for the manufacture of all kinds of steel castings.—*For description see page 356.*

UNITED STATES.

Total number of open-hearth steel works in the United States 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. In addition 4 acid furnaces and 24 basic furnaces were being built or were partly erected.

Total in November, 1901: 112 completed, 12 building, 1 to be rebuilt, and 13 projected. Number of furnaces in the completed works, 167 acid and 236 basic: total, 403.

CRUCIBLE STEEL WORKS.

A list of works equipped for the manufacture of crucible steel castings will be found beginning on page 394.

MASSACHUSETTS—4.

Pope-Robinson Company, Hyde Park. Product, steel castings up to 250 pounds in weight.—*See page 191.*

Tool Steel Casting Company, Chelsea. Product, crucible steel castings for automobiles, machinery, tools, dies, etc.—*See page 191.*

United States Steel Company, Everett. Product, steel castings.—*See page 192.*

Worcester Steel Foundry Company, Worcester. Works at Millbury. Product, small castings from 5 to 600 pounds.—*See page 192.*

CONNECTICUT—2.

Collins (The) Company, Collinsville. Product consumed wholly by

the company in the manufacture of "Collins" edge tools, steel plows, etc.—*See page 195.*

Farist (The) Steel Company, Bridgeport, Fairfield county. Product, rolled and hammered steel.—*For description see page 195.*

NEW YORK—4.

Chrome Steel Works, Brooklyn. Product, tool steel and burglar-proof welded chrome steel and iron, 5-ply, for safes, jails, etc.; also adamantine shoes and dies for crusher stamp mills; also crucible chrome steel castings.—*May be dismantled. See page 200.*

Drew Steel Foundry, E. H. Drew, owner, Lockport. Product, steel castings.—*See page 200.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. Product, steel castings.—*See page 202.*

Sanderson Brothers Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Syracuse, New York. Product, hammered and rolled crucible steel of every description.—*See page 147.*

NEW JERSEY—5.

Chrome Steel Works, Chrome. Telegraph address, Carteret. Product, chrome steel plates, angles, bars, and castings.—*See page 207.*

Crucible Steel Company of America, Pittsburgh. Two crucible steel works in New Jersey. Atha Steel Works, Harrison; product, tool, die, spring, and cutlery steel. West Bergen Steel Works, Jersey City; product, crucible cast steel, bright-drawn steel, and flat cold-rolled steel.—*See pages 144 and 147.*

Heller Brothers Company, Newark. Product, clay crucible steel made into rasps, files, and high-grade tool steel.—*See page 208.*

Ludlum (The) Steel and Spring Company, Pompton. Product, crucible cast steel and railway car springs.—*See page 209.*

PENNSYLVANIA—29.

Adams Crucible Steel Company, New York. Works at Redington, Pa. Product, tool steel, castings, etc.—*See page 216.*

Bethlehem Steel Company, South Bethlehem. Makes crucible steel. Controlled by the United States Shipbuilding Company.—*See page 91.*

Braeburn Steel Company, Braeburn. Product, bar and tool steel. —*See page 266.*

Carpenter Steel Company, Robert E. Jennings, Receiver, Reading. Product, steel for cutlery, tools, dies, wire, forgings, armor-piercing projectiles, etc.—*See page 222.*

Colonial Steel Company, Pittsburgh. Works at Colonia. Product, crucible steel bars, sheets, plates, circular saw plates, forgings, merchant steel, etc.—*See page 260.*

Crucible Steel Company of America, Pittsburgh. Eight crucible steel works in Pennsylvania. Aliquippa Steel Works, Aliquippa; product, special qualities of plate and sheet steel. Beaver Falls Steel Works, Beaver Falls; product, plow, spring, cutlery, file, and tool steel. Black Diamond Steel Works, (operated by the Park Steel Company,) Pittsburgh; product, hammered and rolled crucible steel of every description. Crescent Steel Works, Pittsburgh; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel. Howe, Brown & Co. Works, Pittsburgh; product, crucible cast steel in bars, sheets, rods, plates, and special forgings. La Belle Steel Works, Allegheny; product, high-grade merchant steel of every description. Pittsburgh Steel Works, McKees Rocks; product, plow, saw, sheet, plate, best edge-tool, agricultural, and other grades of crucible steel. Singer, Nimick & Co. Works, Pittsburgh; product, tool, saw, sheet, plate, and agricultural steel.—*See pages 144-47.*

Cyclops Steel Works, Charles Burgess, Titusville. Product, special tool steel.—*See page 267.*

Damascus Nickel Steel Company, Philadelphia. Works at Carnegie. Product, steel bars and Damascus and nickel steel for tools, dies, etc.—*See page 249.*

Damascus Steel Company; general office, Des Moines, Iowa. Works and business office, New Brighton, Pa. Product, crucible tool steel and steel castings.—*See page 260.*

Fairmount Steel Works, Alexander Foster & Co., Philadelphia. Product, frog plates, points, forgings, etc.—*See page 213.*

Firth-Sterling Steel Company, Pittsburgh. Works at Demmler. Product, fine crucible tool steel and Wheeler-Sterling armor-piercing projectiles.—*See page 250.*

Frankford Steel Company, lessee, New York. Works at Frankford, Philadelphia. Product, hammered and rolled steel bars and sheets for tools, saws, knives, files, etc.—*See page 213.*

Hussey-Binns Shovel Company, Pittsburgh. Works at Charleroi. Product, crucible cast steel used by the company in making shovels, spades, and scoops.—*See page 268.*

Jessop Steel Company, New York. Works at Washington, Pa. Product, sheet and saw steel.—*See page 269.*

Keystone Saw, Tool, Steel, and File Works, Henry Disston and Sons Iron and Steel Works, Tacony, Philadelphia. Product, principally saw steel, engravers' plates, and sheet steel. Adding one 36-pot crucible steel-melting furnace.—*See page 113.*

McInnes Steel Company, Limited, Corry. Product, "McInnes" hammered tool steel and McInnes "Extra" air-hardening steel. —*See page 270.*

Midvale (The) Steel Company, Nicetown, Philadelphia. Makes crucible steel.—*See page 214.*

Philadelphia Steel and Iron Company, Frankford, Philadelphia. Product, crucible nickel-steel castings for railroad, automobile, and steamship bearings.—*See page 214.*

Pittsburgh Works, American Steel Foundries, New York. Works at Pittsburgh. Product, steel castings.—*See page 96.*

Vulcan Crucible Steel Company, Aliquippa. Product, high-grade tool steel.—*See page 263.*

Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Make crucible steel.—*See page 257.*

Westmoreland Steel Company, Pittsburgh. Works at Huff Station, near Greensburg. Product, forgings, tool steel, etc.—*See page 273.*

TENNESSEE—1.

Southern (The) Steel Works, Chattanooga. Product, tool steel, forgings, and steel castings.—*For description see page 296.*

OHIO—1.

Canton Crucible Steel Works, Canton. Product, tool steel, wire-drawing plates, and steel castings. Owned by Isaac Bialosky, 118 Hill st., Cleveland.—*Idle and for sale or lease. See page 322.*

INDIANA—1.

Oliver Chilled Plow Works, South Bend. Entire product used by the works in the manufacture of plows.—*See page 334.*

ILLINOIS—2.

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, New Jersey. Works at Chicago Heights, Illinois. Product, cast-steel inserts for brake shoes.—*See page 162.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Mass. Works at Western ave., Sixteenth and Seventeenth sts., Chicago. Product, saw plate and crucible sheet steel.—*See page 340.*

WISCONSIN—8.

Bay View Steel Casting Company, Milwaukee. Product, steel castings.—*See page 347.*

Clinton (The) Burnham Foundry Company, Milwaukee. Product, crucible steel machinery castings.—*See page 347.*

Crucible Steel Casting Company, Milwaukee. Product, machinery castings of all kinds.—*See page 347.*

Dutcher (The J. A. and P. E.) Company, Milwaukee. Product, chiefly bicycle, machinery, and electrical castings.—*See page 347.*

National Electric Company, Milwaukee. Product, steel castings;

specialties, crank shafts, magnet frames, pole pieces, and general machinery castings.—*See page 348.*

Nortmann-Duffke Foundry Company, Layton Park, Milwaukee. Product, steel castings.—*See page 348.*

Smith (George H.) Steel Casting Company, Milwaukee. Product, crucible steel castings.—*See page 348.*

Tobin-Gerlinger Steel Casting Company, West Allis. Product, all kinds of steel castings.—*For description see page 348.*

UNITED STATES.

Total number of plants in the United States in June, 1904, which were equipped for the manufacture of crucible steel: 57.

Total in November, 1901: 45 completed, 3 building, and one projected.

STEEL CASTING WORKS.

A complete list of all works which are equipped for the manufacture of Bessemer, open-hearth, crucible, and "special" steel castings is given below. Capacities are given in gross tons of 2,240 pounds.

MASSACHUSETTS—6.

Pope-Robinson Company, Hyde Park. Crucible steel castings up to 250 pounds in weight; annual capacity, 75 tons.—*See page 191.*

Thomson-Houston Electric Company, Steel Foundry Department, Lynn. (Operating for the General Electric Company, Schenectady, New York.) Acid open-hearth steel castings; annual capacity, 9,000 tons.—*See page 191.*

Tool Steel Casting Company, Chelsea. Product, crucible steel castings for automobiles, machinery, tools, dies, etc.—*See page 191.*

United States Steel Company, Everett. Crucible and acid open-hearth steel castings from ¼ of a pound to 60,000 pounds; annual capacity, 5,400 tons.—*See page 192.*

Watertown Arsenal, Watertown. Tropenas steel castings for gun carriages for Government use; annual capacity, 1,200 tons.—*See page 192.*

Worcester Steel Foundry Company, 67 Union street, Worcester. Works at Millbury. Crucible steel castings ranging from 5 to 600 pounds; annual capacity, 1,200 tons.—*See page 192.*

RHODE ISLAND—1.

Providence Steel Casting Company, Providence. Tropenas steel castings; estimated annual capacity, 2,500 tons.—*See page 193.*

CONNECTICUT—4.

American (The) Tube and Stamping Company, Bridgeport. Basic open-hearth steel castings.—*See page 194.*

Collins (The) Company, Collinsville. Crucible steel castings consumed by the company.—*See page 195.*

Malleable Iron Fittings Company, Branford. Acid open-hearth steel castings for machinery, bicycle, and gun work; annual capacity, 3,000 tons of steel castings. Also makes malleable iron castings; daily capacity, 30 tons.—*See page 195.*

National Steel Foundry Company, New Haven. Acid open-hearth steel castings; annual capacity, 12,000 tons.—*See page 99.*

NEW YORK—7 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Astoria Steel Company, Calby M. Chester, Jr., Receiver, 44 Pine st., New York. Works at Astoria. Basic open-hearth steel castings; annual capacity, 30,000 tons.—*See page 199.*

Brooklyn Navy Yard, Bureau of Construction and Repair, Brooklyn. Contemplates making Tropenas steel castings for ship work for the use of the Navy.—*See page 204.*

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo. Acid open-hearth steel castings; annual capacity, 6,000 tons. Malleable iron castings are also made.—*See page 200.*

Chrome Steel Works, Brooklyn. Crucible chrome steel castings. —*May be dismantled. See page 200.*

Drew Steel Foundry, E. H. Drew, owner, Lockport. Crucible steel castings; annual capacity, 100 tons.—*See page 200.*

Gould Coupler Company, New York City. Works at Depew. All kinds of basic open-hearth steel castings; annual capacity, 30,000 tons. Also makes malleable castings.—*See page 201.*

Hyle (The) Steel Tool Company, Syracuse. Building works for the manufacture of steel castings by a special process for gearings, dies, wrenches, taps, reamers, and other steel tools; estimated annual capacity, 2,400 tons.—*See page 202.*

Johnson (Isaac G.) & Co., Incorporated, Spuyten Duyvil, New York City. Crucible, acid open-hearth, and Tropenas steel castings; annual capacity, single turn, 180 tons of crucible, 5,800 tons of open-hearth, and 1,500 tons of Tropenas steel castings.—*See page 202.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna, Erie county, New York. Basic open-hearth steel castings.—*For description see pages 101-2.*

NEW JERSEY—6.

Atha (Benjamin) & Co., Newark. Special Bessemer and acid and basic open-hearth steel castings; annual capacity, 2,500 tons

of Bessemer and 5,000 tons of acid and 4,000 tons of basic open-hearth castings.—*See page 207.*

Chrome Steel Works, Chrome. Telegraph address, Carteret. Acid open-hearth and crucible steel castings.—*See page 207.*

Delawanna Foundry, The Cooper, Wigand, Cooke Company, New York. Works at Delawanna, New Jersey. Basic open-hearth castings.—*See page 208.*

New Jersey Steel Company, Rahway. Evans-Wills steel castings; annual capacity, 5,000 tons. Adding one 20-gross-ton acid open-hearth steel furnace for the manufacture of castings.—*See page 209.*

Passaic Steel Company, Paterson. Acid and basic open-hearth steel castings.—*See page 209.*

Taylor Iron and Steel Company, High Bridge. Hadfield's manganese, nickel, chrome, and other steel castings.—*See page 210.*

PENNSYLVANIA—42 COMPLETED AND 1 PROJECTED.

Adams Crucible Steel Company, New York. Works at Redington, Pa. Crucible steel castings.—*See page 216.*

Altoona Foundry and Machine Company, Altoona. Malleable iron castings, but acid open-hearth steel castings could be made; daily capacity, 10 tons of malleable castings. Also gray iron castings; daily capacity, 30 tons.—*Open-hearth furnace idle. See page 242.*

Ambridge Plant, American Bridge Company, Pittsburgh. May erect at Ambridge, Beaver county, an acid open-hearth steel furnace for the manufacture of castings.—*See page 66.*

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Open-hearth castings; annual capacity, 2,500 tons. Also iron castings; annual capacity, 17,500 tons.—*See page 140.*

American Steel Foundries, New York. Four works in Pennsylvania, all of which make steel castings. Franklin Works, Franklin; annual capacity, 12,000 tons of open-hearth castings. Pittsburgh Works, Pittsburgh; annual capacity, 7,500 tons of open-hearth and crucible castings. Sharon Works, Sharon; annual capacity, 45,000 tons of open-hearth castings. Thurlow Works, Thurlow; annual capacity, 36,000 tons of open-hearth castings.—*See pages 95-6.*

Bethlehem Steel Company, South Bethlehem. Open-hearth steel castings.—*See page 91.*

Brylgon Steel Casting Company, Reading. Bookwalter steel castings; annual capacity, 3,000 tons.—*To be dismantled. See page 221.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Open-hearth steel castings.—*See page 136.*

Chester Steel Castings Company, Philadelphia. Works at Chester. Acid open-hearth steel castings; also McHaffie castings; annual capacity, single turn, 15,000 tons.—*See page 228.*

Columbia Iron and Steel Foundry, W. J. Carlin Company, Pittsburgh. Acid open-hearth steel castings; annual capacity, 2,000 tons.—*Idle and for sale or lease. May be dismantled. See page 249.*

Damascus Steel Company; general office, Des Moines, Iowa. Works and business office, New Brighton, Pa. Crucible steel castings. —*See page 260.*

Delaware River Steel Casting Company, Chester. Acid open-hearth steel castings for machinery, engines, electrical work, locomotives, ships, etc.; annual capacity, 18,000 tons.—*See page 228.*

Diamond Drill and Machine Company, Birdsboro. Acid open-hearth steel castings for locomotives, ships, rolling mills, electrical machinery, etc.; annual capacity, 25,000 tons. Also gray iron and air furnace castings; annual capacity, 12,500 tons.—*See page 222.*

Duncan Chemical Company, Washington. Acid open-hearth steel castings.—*Idle and for sale. See page 267.*

Duquesne Steel Foundry Company, Pittsburgh. Works at Kendall Station. Acid open-hearth steel castings; annual capacity, 10,000 tons.—*See page 249.*

Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Acid open-hearth castings; annual capacity, 6,000 tons.—*See page 250.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Basic open-hearth steel castings.—*See page 237.*

Homestead Steel Works, Carnegie Steel Company, Pittsburgh. Works at Munhall. Basic open-hearth steel castings for the use of the works; annual capacity, 3,300 tons.—*See pages 12 and 16.*

Johnstown Works, The Lorain Steel Company, Philadelphia. Works at Johnstown. Acid open-hearth steel castings; annual capacity, 6,400 tons. Also make gray iron castings; annual capacity, 4,680 tons.—*See page 33.*

Logan Manufacturing Company, Phœnixville. Tropenas steel castings; annual capacity, 1,000 tons. Also makes gray iron castings; annual capacity, 7,500 tons.—*Steel plant idle. See page 225.*

Lukens Iron and Steel Company, Coatesville. Open-hearth castings for its own use; annual capacity, 1,200 tons.—*See page 133.*

McConway (The) and Torley Company, Pittsburgh. Acid open-hearth car couplers; annual capacity, 20,000 tons. Also malleable iron castings; annual capacity, 15,000 tons.—*See page 252.*

Mesta Machine Company, Pittsburgh. Works at Homestead. Acid open-hearth steel rolls and general castings; also machine-moulded gears; annual capacity, 10,000 tons. Also makes gray iron and air furnace castings; annual capacity, 36,000 tons.—*See page 252.*

Midvale (The) Steel Company, Nicetown, Philadelphia. Open-hearth and crucible steel castings.—*See page 214.*

National (The) Malleable Castings Company, Sharon. General of-

fice, Cleveland, Ohio. Acid open-hearth steel castings; annual capacity, 45,000 tons.—*See page 261.*

Norway Iron and Steel Company, York. Small acid open-hearth steel castings for gear work, etc.; annual capacity, 6,000 tons. Also makes malleable iron castings.—*See page 238.*

Pencoyd Iron Works, A. and P. Roberts Company, operators, Philadelphia. Works in Montgomery county, opposite Manayunk. Basic open-hearth steel castings.—*See page 66.*

Penn Steel Casting and Machine Company, Chester. Acid open-hearth steel castings; annual capacity, single turn, 12,000 tons. Also makes cast-steel pipe.—*See page 229.*

Pennsylvania Malleable Company, Pittsburgh. Works at McKees Rocks. Acid open-hearth car couplers and miscellaneous castings; annual capacity, 40,000 tons. Also makes malleable castings; daily capacity, 65 tons.—*See page 253.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Acid open-hearth steel castings; annual capacity, 18,000 tons.—*See page 119.*

Philadelphia Steel and Iron Company, Frankford, Philadelphia. "Atlas" steel castings; annual capacity, 1,800 tons. Also makes crucible nickel-steel castings for railroad, automobile, and steamship bearings.—*See page 214.*

Phœnix (The) Iron Company, Philadelphia. Works at Phœnixville. Open-hearth steel castings.—*See page 116.*

Pittsburgh Steel Foundry, Pittsburgh. Works at Glassport. Acid and basic castings; annual capacity, 60,000 tons.—*See page 254.*

Seaboard Steel Casting Company, Chester. Acid open-hearth steel castings; annual capacity, 25,000 tons.—*See page 229.*

Solid Steel Casting Company, Chester. Works at Lamokin. Acid open-hearth steel castings; annual capacity, 10,000 tons. Specialties, locomotive and machinery castings.—*See page 229.*

Standard (The) Steel Works, Philadelphia. Works at Burnham. Acid open-hearth steel castings. Also iron castings.—*See page 244.*

Sterling Steel Foundry Company, Pittsburgh. Works at Braddock. Acid open-hearth castings; annual capacity, 25,000 tons.—*See page 255.*

Union Steel Casting Company, Pittsburgh. Acid open-hearth steel castings; annual capacity, single turn, 12,000 tons.—*See page 256.*

United Engineering and Foundry Company, Pittsburgh. Works at Vandergrift. Basic open-hearth steel castings; annual capacity, 9,000 tons.—*See page 272.*

Wharton, Jr., (William) & Co., Incorporated, Philadelphia. Tropenas steel castings, consumed by the firm in its switch works; annual capacity, 2,000 tons.—*See page 214.*

DELAWARE—2 COMPLETED AND 1 BUILDING.

Baldt (The) Steel Company, New Castle. Acid open-hearth castings; annual capacity, from 15,000 to 20,000 tons.—*See page 274.*

Brylgon Steel Casting Company, New Castle. Building works for the manufacture of Bookwalter steel castings; estimated annual capacity, 3,000 tons.—*Works may be completed in July, 1904. See page 274.*

Diamond (The) State Steel Company, Wilmington. Acid and basic open-hearth steel castings.—*For description see page 274.*

DISTRICT OF COLUMBIA—1.

Naval Gun Factory, United States Navy Yard, Washington. Tropenas steel castings for ordnance for the use of the Navy; annual capacity, 300 tons.—*For description see page 278.*

VIRGINIA—1.

Newport News Shipbuilding and Dry Dock Company, No. 1 Broadway, New York. Works at Newport News, Warwick county, Virginia. Tropenas high-grade steel castings up to 6,000 pounds; annual capacity, 1,000 tons.—*For description see page 283.*

WEST VIRGINIA—1 COMPLETED AND 1 BUILDING.

Ohio Valley Steel and Foundry Company, Robert Miller, Receiver, Pittsburgh, Pa. Building works at Paden City, W. Va.; product, to be acid and basic open-hearth steel castings for railroad work; total annual capacity, 18,000 tons.—*See page 286.*

West Virginia Malleable Iron Company, Point Pleasant, Mason county. High-grade open-hearth malleable iron castings, but acid steel castings could be made.—*For description see page 287.*

TENNESSEE—1.

Southern (The) Steel Works, Chattanooga. Acid open-hearth and crucible steel castings.—*For description see page 296.*

ALABAMA—1 COMPLETED AND 1 BUILDING.

Birmingham Steel and Iron Company, Birmingham. Building one basic open-hearth steel furnace for the manufacture of general machinery castings; estimated annual capacity, 6,000 tons. Now makes gray iron castings.—*See page 304.*

Tennessee Coal, Iron, and Railroad Company, Birmingham. Steel Casting Department: Works at Ensley. Basic open-hearth car couplers, gears, rolls, engine parts, and other steel castings; annual capacity, 12,000 tons.—*For description see page 182.*

OHIO—14 COMPLETED AND 3 PROJECTED.

Alliance Works, American Steel Foundries, New York. Works at

Alliance, Ohio. Basic open-hearth steel castings; annual capacity, 60,000 tons.—*See page 95.*

Buckeye (The) Steel Castings Company, Columbus. Acid and basic open-hearth car couplers and general castings; annual capacity, 11,000 tons of acid and 36,000 tons of basic castings. Also makes malleable castings; daily capacity, 60 tons.—*See page 322.*

Canton Crucible Steel Works, Canton. Crucible steel castings.—*Idle and for sale or lease. See page 322.*

Cleveland (The) Steel Casting Company, Cleveland. Acid open-hearth steel castings; annual capacity, 11,000 tons.—*See page 313.*

Columbus (The) Malleable Iron Company, Columbus. Malleable iron castings, but can make acid open-hearth steel castings; daily capacity, 25 tons of malleable castings.—*See page 323.*

Coxey Steel and Silica Sand Company, James Israel, Receiver, Mount Vernon. Acid open-hearth steel castings; annual capacity, 2,500 tons. Also makes gray iron, brass, and bronze castings.—*Company may be reorganized. See page 323.*

Dithridge Steel Car Company, Jersey City, New Jersey. Contemplates erecting works near Newcomerstown, Ohio, for the manufacture of basic open-hearth steel castings.—*See page 327.*

Marion (The) Steam Shovel Company, Marion. Robert-Bessemer steel castings, all consumed by the company; annual capacity, 2,400 tons.—*See page 325.*

Menough (The) Foundry Company, Incorporated, Wellsville. Contemplates erecting a basic open-hearth furnace or a small Bessemer converter for the manufacture of light and heavy steel castings. Now makes gray iron castings.—*See page 329.*

National (The) Steel Castings Company, Williamson Building, Cleveland. Contemplates erecting works at Ravenna for the manufacture of Tropenas steel castings.—*See page 327.*

Newark Iron and Steel Company, William E. Miller, Receiver, Newark. Acid open-hearth steel castings; annual capacity, 3,000 tons.—*See page 325.*

Otis (The) Steel Company, Limited, Cleveland. Acid and basic open-hearth castings; annual capacity, 10,000 tons.—*See page 314.*

Portsmouth Steel Company, Wheeling, W. Va. Works at Portsmouth, Ohio. Open-hearth steel castings; annual capacity, 600 tons. Also makes gray iron castings.—*See page 319.*

Steubenville Works, La Belle Iron Works, Steubenville. Basic open-hearth steel general mill castings.—*See page 152.*

United (The) Steel Company, Canton. Acid and basic open-hearth steel castings.—*See page 326.*

Wellman-Seaver-Morgan (The) Company, Cleveland. Basic open-hearth steel castings; annual capacity, 6,000 tons.—*See page 157.*

Youngstown (The) Steel Casting Company, Youngstown. Acid open-hearth steel castings; annual capacity, 4,000 tons.—*See page 311.*

INDIANA—7 COMPLETED AND 1 BUILDING.

Gould Steel Company, New York. Works at Anderson, Indiana. Acid open-hearth steel castings; annual capacity, 9,000 tons.—*See page 332.*

Indiana Harbor Works, American Steel Foundries, New York. Building works at Indiana Harbor, Indiana, for the manufacture of acid and basic open-hearth locomotive, car, and other steel castings; estimated annual capacity, 15,000 tons of acid and 15,000 tons of basic castings.—*See page 95.*

Matthews Steel Casting Company, Octave Jacqman, Receiver, Matthews. Acid open-hearth steel machinery castings; annual capacity, 3,000 tons.—*Idle and for sale. See page 333.*

National Car Coupler Company, Chicago. Works at Converse, Indiana. Acid open-hearth freight and passenger car couplers, steel platforms, platform buffers, and other steel castings; annual capacity, 7,500 tons.—*See page 334.*

National Steel Casting Company, Montpelier. Acid open-hearth steel car couplers, knuckles, and other castings from 5 to 20,000 pounds; annual capacity, 15,000 tons. Specialty, railroad, mining, and electric castings.—*See page 334.*

Oliver Chilled Plow Works, South Bend. Crucible castings, all consumed by the works.—*See page 334.*

Peru Steel Casting Company, Peru. Basic open-hearth castings for machine and railroad work from 100 to 75,000 pounds; annual capacity, 14,000 tons.—*See page 335.*

Whiteley Steel Company, Muncie. McHaffie crown steel castings; annual capacity, 2,250 tons.—*For description see page 335.*

ILLINOIS—8 COMPLETED AND 1 PROJECTED.

American Steel Foundries, New York. Two works in Illinois: East St. Louis Works, East St. Louis; basic open-hearth steel car trucks, car bolsters, pilot couplers, and other castings; annual capacity, 40,000 tons. Granite City Works, Granite City; basic open-hearth steel railway and other large castings; annual capacity, 50,000 tons.—*See page 95.*

Chicago Heights Works, American Brake Shoe and Foundry Company, Mahwah, New Jersey. Works at Chicago Heights, Illinois. Tropenas steel brake shoes and miscellaneous castings; annual capacity, 8,000 tons. Also make crucible cast-steel inserts for brake shoes; annual capacity, 500 tons. Also gray iron brake shoes and miscellaneous castings; annual capacity, 18,000 tons.—*See page 162.*

Chicago Malleable Castings Company, Chicago. Works at West Pullman. Basic open-hearth steel gears, pinions, and small castings; annual capacity, 1,000 tons. Also makes malleable iron castings.—*See page 336.*

Commonwealth Steel Company, St. Louis, Missouri. Works at Granite City, Illinois. Acid and basic open-hearth steel castings exclusively; annual capacity, 20,000 tons of acid and 50,000 tons of basic castings.—*See page 337.*

Illinois (The) Steel Company, Chicago. Two works: Joliet Works, at Joliet; Bessemer steel castings for the use of the company. South Works, at South Chicago; Bessemer and open-hearth steel castings for the use of the company.—*See pages 28-30.*

Melrose Park Works, Latrobe Steel and Coupler Company, Philadelphia. Works at Melrose Park, Illinois. Acid open-hearth automatic car couplers and other steel castings; annual capacity, 35,000 tons.—*See page 339.*

St. Louis Steam Forge and Iron Works, East St. Louis. May erect acid and basic open-hearth steel furnaces for the manufacture of small castings.—*For a description of the works see page 339.*

MICHIGAN—1 COMPLETED AND 1 PROJECTED.

Detroit (The) Steel Casting Company, Detroit. Robert-Bessemer steel castings; annual capacity, 5,000 tons.—*See page 344.*

Michigan Steel Casting Company, Detroit. Contemplates building a plant at Delray, Wayne county, for the manufacture of acid open-hearth steel ship, bridge, and other castings.—*See page 345.*

WISCONSIN—10.

Bay View Steel Casting Company, Milwaukee. Crucible and acid open-hearth castings; annual capacity, 750 tons.—*See page 347.*

Clinton (The) Burnham Foundry Company, Milwaukee. Crucible machinery castings; annual capacity, 1,200 tons.—*See page 347.*

Crucible Steel Casting Company, Milwaukee. Crucible steel machinery castings; annual capacity, 1,200 tons.—*See page 347.*

Dutcher (The J. A. & P. E.) Company, Milwaukee. Crucible and acid open-hearth steel castings, chiefly for bicycle, electrical, and machinery purposes; annual capacity, 900 tons of open-hearth and 75 tons of crucible castings.—*See page 347.*

Falk (The) Company, Milwaukee. All kinds of acid open-hearth steel castings; annual capacity, 8,000 tons.—*See page 347.*

Milwaukee Steel Foundry Company, Milwaukee. Special converter steel castings from ½ of a pound to 500 pounds; specialties, electrical steel, tool steel, manganese steel, and machinery steel; annual capacity, 2,000 tons.—*See page 348.*

National Electric Company, Milwaukee. Crucible steel castings; spe-

cialties, crank shafts, magnet frames, pole pieces, and general machinery castings; annual capacity, 800 tons.—*See page 348.*

Nortmann-Duffke Foundry Company, Layton Park, Milwaukee. Crucible steel castings; annual capacity, 1,300 tons. Also makes all kinds of iron machinery castings; daily capacity, 15 tons.—*For description see page 348.*

Smith (George H.) Steel Casting Company, Milwaukee. Crucible and special converter steel castings; annual capacity, 3,000 tons of special and 500 tons of crucible castings.—*See page 348.*

Tobin-Gerlinger Steel Casting Company, West Allis. All kinds of crucible steel castings; annual capacity, 600 tons.—*See page 348.*

MINNESOTA—1.

American Hoist and Derrick Company, St. Paul. Tropenas steel castings; annual capacity, 1,000 tons.—*See page 350.*

MISSOURI—1.

Scullin-Gallagher Iron and Steel Company, St. Louis. Basic open-hearth steel castings up to 60,000 pounds and bolsters and couplers; annual capacity, 40,000 tons.—*See page 352.*

COLORADO—1 COMPLETED AND 1 PROJECTED.

Denver (The) Steel Casting Company, Denver. May erect works at South Denver for the manufacture of acid and basic open-hearth steel castings; estimated annual capacity, 6,000 tons of acid and 6,000 tons of basic castings. Bessemer steel castings may also be made.—*See page 353.*

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Open-hearth steel machinery castings for the use of the company.—*See page 172.*

OREGON—1.

Columbia Engineering Works, Incorporated, Portland. Surface-blown Bessemer castings; annual capacity, 1,200 tons.—*See page 355.*

CALIFORNIA—2 COMPLETED AND 1 PROJECTED.

Abner Doble Company, San Francisco. May erect a plant in the Potrero for the manufacture of basic open-hearth steel castings; estimated annual capacity, 6,000 tons.—*See page 357.*

Pacific Jupiter Steel Company, San Francisco. Works at South San Francisco. All kinds of acid open-hearth steel castings; annual capacity, 8,000 tons.—*See page 356.*

Union Iron Works, San Francisco. Works in the Potrero. Tropenas steel castings, consumed by the works in their shipbuilding plant; annual capacity, 2,000 tons. Controlled by the United States Shipbuilding Company.—*See page 93.*

UNITED STATES.

Total number of plants in the United States in June, 1904, which were equipped for the manufacture of steel castings: 119 completed, 5 building, and 9 projected. Of the completed plants 20 can make Bessemer steel or modified Bessemer steel castings, 84 can make open-hearth steel castings, 26 can make crucible steel castings, and 4 can make special steel castings.

Total in November, 1901: 75 completed, 4 building, one to be rebuilt, and 2 projected. Of the completed plants 13 could make Bessemer steel castings or modified Bessemer steel castings, 56 could make open-hearth steel castings, 14 could make crucible steel castings, and 4 could make steel castings by special processes.

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—2.

Buffalo Steel Company, Tonawanda. Light tee rails, (12, 16, 20, 25, and 30 pounds per yard.)—*See page 199.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna. Standard sections of steel rails; also 12 to 65-pound rails.—*For description see page 101.*

NEW JERSEY—1.

Tremley Point Plant, American McKenna Process Company, Milwaukee, Wisconsin. Works at Tremley Point, New Jersey. Renewed steel rails.—*For a description of these works see page 211.*

PENNSYLVANIA—11.

American Iron and Steel Works, Jones and Laughlin Steel Company, Pittsburgh. Light steel rails.—*See page 139.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Standard, light, and street rails.—*See page 136.*

Carnegie Steel Company, Pittsburgh. Two works in Pennsylvania which roll steel rails: Edgar Thomson Steel Works, Bessemer; standard sections of steel rails; also light rails. McCutcheon Mill, Allegheny; light rails (16 to 20 pounds) rolled from short length "seconds" or ends from standard steel rails.—*See pages 11 and 13.*

Clearfield Steel and Iron Company, Pittsburgh. Works at Centre. Post-office and telegraph address, Clearfield. Iron and steel rails.—*See page 267.*

Combination (The) Steel and Iron Company, Chester. Light rails.—*Idle and for sale or lease. See page 228.*

Green Ridge Iron Works, Susan Spencer, owner, Scranton. Strap rails.—*Idle and for sale or lease. See page 232.*

Hollidaysburg Iron and Nail Company, Hollidaysburg. Flat and small tee rails.—*See page 243.*

Montour Rolling Mills Department, Reading Iron Company, Reading. Works at Danville. Iron and steel rails.—*See page 125.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Rails of all sections; also street rails.—*See page 119.*

Sharon Works, Republic Iron and Steel Company, Chicago. Works at Sharon. Light tee rails.—*For description see page 87.*

MARYLAND—3.

Cumberland Rolling Mill, Schonthal Iron and Steel Company, lessee, Cumberland. General sales office, Columbus, Ohio. Renewed light steel rails from 16 to 40 pounds to the yard.—*See page 277.*

Maryland (The) Rail Company, Cumberland. Light rerolled steel rails.—*See page 277.*

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 121.*

WEST VIRGINIA—2.

Fairmont Steel Company, Fairmont. Steel rails from 12 to 50 pounds to the yard.—*See page 285.*

Union Rail Company, Huntington. Steel rails from 16 pounds to 50 pounds to the yard.—*For description see page 287.*

TENNESSEE—1.

Knoxville Iron Company, Knoxville. Works at Lonsdale, a suburb of Knoxville. Tee rails from 12 to 30 pounds to the yard; also street rails.—*For a description of these works see page 296.*

GEORGIA—1.

Atlanta Steel Hoop Company, Atlanta. Light rails.—*See page 298.*

ALABAMA—4.

Republic Iron and Steel Company, Chicago. Two works in Alabama which are equipped for the manufacture of rails: Alabama Works, Gate City; light tee rails. Birmingham Rolling Mills, (operated by the Birmingham Rolling Mill Company,) Birmingham; small tee rails.—*See page 84.*

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley. Basic open-hearth steel rails.—*See page 182.*

Weller Rolling Mill and Forge Company, Anniston. Light tee rails. —*For a description of these works see page 305.*

OHIO—7 COMPLETED AND 1 PROJECTED.

Cambridge Rolling Mill Company, Cambridge. Light rails.—*See page 322.*

Carnegie Steel Company, Pittsburgh. Two works in Ohio which are equipped for the manufacture of rails: Girard Mill, Girard; small tee rails. Ohio Steel Works, Youngstown; standard sections of steel rails.—*See pages 11 and 14.*

Columbus Iron Works, Standard Chain Company, Pittsburgh. Works at Columbus, Ohio. Light tee rails.—*See page 148.*

Eagle Works, Republic Iron and Steel Company, Chicago. Works at Ironton, Ohio. Light rails.—*See page 86.*

Elyria (The) Iron and Steel Company, Elyria. May reroll rails into light sections.—*See page 313.*

Independent (The) Rolling Mill Company, Cuyahoga Falls. Light iron rails.—*See page 324.*

Lorain Works, The National Tube Company, (of Ohio,) Lorain. Girder and tee rails.—*For a description of these works see page 32.*

INDIANA—1.

Ohio Falls Iron Company, New Albany. Light rails.—*See page 334.*

ILLINOIS—5.

Illinois (The) Steel Company, Chicago. Two works in Illinois which are equipped for the manufacture of rails: Joliet Works, Joliet; standard sections of steel rails. South Works, South Chicago; standard sections of steel rails.—*See pages 28–9.*

Joliet Plant, American McKenna Process Company, Milwaukee, Wisconsin. Works at Joliet, Illinois. Renewed steel rails by the McKenna process.—*See page 338.*

Republic Iron and Steel Company, Chicago. Two works in Illinois which are equipped for the manufacture of rails: Sylvan Works, Moline; small tee rails. Tudor Works, East St. Louis; tee rails.—*For a description of these works see page 87.*

WISCONSIN—1.

Milwaukee Works, The Illinois Steel Company, Chicago. Works at Milwaukee, Wisconsin. Light rails from 12 to 45 pounds per yard.—*For a description of these works see page 29.*

MISSOURI—1.

Hirsch Rolling Mill Company, St. Louis. Light rails.—*See page 351.*

KANSAS—1.

Kansas City Plant, McKenna Steel Working Company, Milwaukee, Wisconsin. Works at Kansas City, Kansas. Renewed steel rails by the McKenna process.—*For description see page 352.*

COLORADO—2.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Standard steel rails and steel mine rails.—*See page 172.*

Union Rolling Mills, Union Iron and Steel Company, New York. Works at Denver. Eight, 12, and 16-lb. tee rails.—*See page 106.*

WYOMING—1.

Laramie Rolling Mills, Union Pacific Railroad Company, Laramie. Mine rails.—*For a description of these works see page 353.*

WASHINGTON—1 BUILDING.

Seattle Steel Company, Seattle. Building works at West Seattle for the manufacture of 8, 12, 16, and 20-lb. tee rails.—*See page 354.*

UNITED STATES.

Total number of mills in the United States in June, 1904, which were equipped to roll standard or light sections of iron or steel rails: 44 completed, one building, and one projected.

Total in November, 1901: 45 completed and 3 building.

IRON AND STEEL STRUCTURAL MILLS.

A complete list of all works which are equipped for the manufacture of beams, girders, tees, angles, channels, and other forms of structural shapes is given below. Works equipped for the manufacture of bridge rods, building rods, eyebars, structural tubing, etc., are also included.

MAINE—1.

Portland Rolling Mill, Portland Iron and Steel Company, Boston. Works at Ligonia, South Portland, Maine. Angles.—*See page 189.*

MASSACHUSETTS—1.

Kinsley Iron and Machine Company, Canton. Building rods, etc. —*For a description of these works see page 190.*

NEW YORK—4.

Buffalo Steel Company, Tonawanda. Bessemer steel angles, chan-

nels, tees, and special shapes for agricultural implements and other purposes.—*See page 199.*

Elmira Steel Works, E. B. Leaf & Co., Philadelphia. Works at Elmira, New York. Iron and steel angles, universal plates, etc.—*Idle and for sale or lease. See page 201.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna. Structural shapes, etc.—*For description see page 101.*

Standard Rolling Mill, M. J. Dempsey, New York. Iron angles, etc.—*For a description of these works see page 203.*

NEW JERSEY—3.

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton. Iron angles.—*See page 207.*

Chrome Steel Works, Chrome. Telegraph address, Carteret. Chrome steel plates, angles, (3, 4, 6, and 8-inch,) etc.—*See page 207.*

Passaic Steel Company, Paterson. Structural shapes, including beams, channels, angles, tees, universal plates, etc. A bridge-building department and a steel eyebar plant are connected with the works.—*For a description of these works see page 209.*

PENNSYLVANIA—29.

Allentown (The) Rolling Mills, Philadelphia. Works at Allentown. Iron angles, bridge work, etc.—*See page 217.*

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 139–40.*

Bethlehem Steel Company, South Bethlehem. Steel beams, tees, angles, etc. Controlled by the United States Shipbuilding Company.—*See page 91.*

Brandywine Rolling Mills, Worth Brothers Company, Coatesville. Open-hearth steel plates for tank and structural work.—*For description see page 129.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Steel structural shapes.—*See page 136.*

Carnegie Steel Company, Pittsburgh. Four mills in Pennsylvania which are equipped for the manufacture of structural shapes: Homestead Steel Works, Munhall; structural shapes, structural work, and ship, tank, and universal plates. McCutcheon Mill, Allegheny; light angles. Sharon Steel Works, Sharon; steel angles. Upper Union Mills, Pittsburgh; structural shapes, columns, girders, and other fitted structural work.—*See pages 12, 13, and 15.*

Central Iron and Steel Company, Harrisburg. Universal bridge, ship, and structural plates.—*See page 134.*

Combination (The) Steel and Iron Company, Chester. Iron or steel angles.—*Idle and for sale or lease. See page 228.*

Danville Structural Tubing Company, (a copartnership,) Danville. Structural tubing, covered by patents, consisting of round unwelded tubing from ½-inch to 2 inches in diameter.—*See page 232.*

Davis Brothers, Philadelphia. Small angles.—*See page 212.*

Eastern (The) Steel Company, Pottsville. Steel beams, channels, angles, tees, etc. A bridge shop is connected with the works. —*See page 223.*

Franklin (The) Rolling Mill and Foundry Company, B. Haskell and Edward E. Hughes, Receivers, Franklin. "U" shapes for the manufacture of tripartite steel poles.—*See page 268.*

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 page 127.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Angles up to 6 x 6 inches, tees, light channels, and other special shapes. —*See page 237.*

Hollidaysburg Iron and Nail Company, Hollidaysburg. Channel iron.—*See page 243.*

Logan Iron and Steel Company, Burnham. Philadelphia office, Harrison Building. Bridge iron, angles, etc.—*See page 243.*

Lukens Iron and Steel Company, Coatesville. Open-hearth steel ship, bridge, and tank plates.—*See page 132.*

Montour Rolling Mills Department, Reading Iron Company, Reading. Works at Danville. Angle iron and iron and steel angle bars.—*See page 125.*

Pencoyd Iron Works, A. and P. Roberts Company, operators, Philadelphia. Works in Montgomery county, opposite Manayunk. 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. Bridge and construction department contains equipment for all classes of bridge and architectural work; also a hydraulic forge shop for manufacturing solid forged steel eyebars from 3 to 12 inches wide. Controlled by the American Bridge Company.—*See pages 66–7.*

Penn Iron Company, Limited, Lancaster. Iron for bridge work, etc.—*See page 238.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Bessemer and open-hearth steel structural shapes. Construction department erects iron and steel buildings and bridges. —*See pages 119–20.*

Phœnix (The) Iron Company, Philadelphia. Works at Phœnixville. 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 with a capacity of 2,000,000 pounds.—*See page 116.*

Reading Works, American Iron and Steel Manufacturing Company, Lebanon. Works at Reading. Rods, plates, straps, and forgings for cars, bridges, buildings, etc.—*See page 123.*

Sterlingworth Railway Supply Company, Philadelphia. Works at Easton. Deck beams for brake beam sections.—*See page 218.*

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 256.*

DELAWARE—2.

Diamond (The) State Steel Company, Wilmington. Two mills. Bridge rods.—*For a description of these works see page 274.*

VIRGINIA—2.

Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle, Richmond. Bridge iron.—*See page 283.*

Tredegar Iron Works, The Tredegar Company, Richmond. Bridge iron.—*For a description of these works see page 284.*

KENTUCKY—2.

Licking Iron Works, Licking Rolling Mill Company, Incorporated, Covington. Angle, tee, jail, sash iron, etc.—*See page 290.*

Mitchell-Tranter Works, Republic Iron and Steel Company, Chicago. Works at Covington, Kentucky. Channels, angles, etc., for buildings, bridges, etc.—*For description see page 86.*

TENNESSEE—1.

Knoxville Iron Company, Knoxville. Works at Lonsdale, a suburb of Knoxville. Light sections of angle and channel iron.—*For a description of these works see page 296.*

ALABAMA—4.

Eclipse Rolling Mill and Manufacturing Company, East Birmingham. Bedstead iron, angles, etc.—*See page 305.*

Republic Iron and Steel Company, Chicago. Two mills in Alabama which are equipped for the manufacture of structural shapes: Alabama Works, Gate City; angles from 1 inch to 2½ inches and light channels. Birmingham Rolling Mills, (operated by the Birmingham Rolling Mill Company,) Birmingham; iron and open-hearth steel angles.—*See page 84.*

Steel Works Division, Tennessee Coal, Iron, and Railroad Company, Birmingham. Works at Ensley. Open-hearth steel I beams, channels, or angles.—*For a description of these works see page 182.*

OHIO—10.

American (The) Rolling Mill Company, Middletown. Sheet steel building materials of all kinds.—*See page 321.*

Cambridge Rolling Mill Company, Cambridge. Bessemer steel angles, U bars, channel flats, etc.—*See page 322.*

Carnegie Steel Company, Pittsburgh. Three mills in Ohio which are equipped for the manufacture of structural shapes: Girard Mill, Girard; angles, channels, tees, and special shapes. Lower Union Mill, Youngstown; shapes. Upper Union Mill, Youngstown; angles and special shapes.—*See pages 11, 13, and 15.*

Elyria (The) Iron and Steel Company, Elyria. Small structural shapes and tubing suitable for bedsteads.—*See page 313.*

Independent (The) Rolling Mill Company, Cuyahoga Falls. Light structural shapes.—*See page 324.*

Republic Iron and Steel Company, Chicago. Two mills in Ohio which are equipped for the manufacture of structural shapes: Brown Bonnell Works, Youngstown; channels, angles, universal plates, etc. Mahoning Valley Works, Youngstown; iron angles, etc.—*See pages 85-6.*

Union (The) Rolling Mill Company, Cleveland. Works and office at Newburgh, in the city of Cleveland. Bridge iron.—*See page 315.*

INDIANA—4.

Central Steel Company, Indianapolis. Beams from 6 to 20 inches. —*Idle and for sale or lease. See page 330.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana. Angles, I beams, channels, etc.—*See page 163.*

Indiana Works, Republic Iron and Steel Company, Chicago. Works at Muncie, Indiana. Iron and steel bridge rods, etc.—*See page 86.*

Ohio Falls Iron Company, New Albany. Bar iron for bridge work, etc.; specialty, wide flats up to 12 inches.—*See page 334.*

ILLINOIS—2 COMPLETED AND 2 PROJECTED.

Aermotor Company, Chicago. Contemplates engaging in the manufacture of angles, etc., at Chicago Heights.—*See page 341.*

Deering Mills, International Harvester Company, Chicago. Works at Chicago. Angles, channels, etc.—*See page 160.*

Chicago Heights Works, Inland Steel Company, Chicago. Works at Chicago Heights. Angles, tees, channels, etc.—*See page 163.*

South Works, The Illinois Steel Company, Chicago. Works at South

Chicago. Contemplate erecting one 28-inch structural mill with an estimated annual capacity of 150,000 tons.—*See page 29.*

WISCONSIN—1.

West Superior Branch, United States Cast Iron Pipe and Foundry Company, New York. Works at West Superior, Wisconsin. Steel structural shapes.—*Idle and for sale or lease. See page 349.*

MISSOURI—1.

Hirsch Rolling Mill Company, St. Louis. Iron and steel angles, shapes, etc.—*For a description of these works see page 351.*

COLORADO—1.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Structural shapes, angle bars, etc.—*For a description of these works see page 172.*

WASHINGTON—1 BUILDING.

Seattle Steel Company, Seattle. Building works at West Seattle for the manufacture of angles, channels, etc.—*See page 354.*

CALIFORNIA—2.

Judson Manufacturing Company, Oakland. Office and salesroom, San Francisco. Structural and agricultural shapes.—*See page 356.*

Southern Pacific Company, Sacramento. I beams, angle iron, etc. —*For a description of these works see page 356.*

UNITED STATES.

Total number of works in the United States in June, 1904, which were equipped to roll iron or steel structural shapes, bridge rods, etc.: 70 completed, one building, and 2 projected.

Total in November, 1901: 67 completed and 2 building.

IRON AND STEEL WIRE-ROD MILLS.

The capacities given below are in gross tons of 2,240 pounds. A list of wire-drawing and wire-nail works will be found on pages 97–116 of a Supplement to the Directory for 1901, which appeared in April, 1903.

MASSACHUSETTS—1.

South Works, American Steel and Wire Company of New Jersey, Chicago. Works at Worcester, Mass. Annual capacity, 155,000 tons.—*For a description of these works see page 45.*

RHODE ISLAND—2.

Washburn Wire Company, Phillipsdale. Two works in Rhode Island which roll rods: Phillipsdale Plant, at Phillipsdale; flat and round rods; annual capacity, 20,000 tons. Auburn Plant, at Auburn; rods; annual capacity, 20,000 tons.—*See page 193.*

CONNECTICUT—1.

National (The) Wire Corporation, New Haven. Annual capacity, 90,000 tons. Controlled by the National Steel and Wire Company.—*For a description of these works see page 99.*

NEW YORK—1.

Wickwire Brothers, Cortland. Annual capacity, 40,000 tons.—*For a description of these works see page 204.*

NEW JERSEY—3.

Atha Steel Works, Crucible Steel Company of America, Pittsburgh. Works at Harrison, New Jersey. Wire rods in coils.—*For description see page 144.*

Roebling's (John A.) Sons Company, Trenton. Annual capacity, 45,000 tons.—*See page 210.*

Trenton (The) Iron Company, Trenton. Iron and steel wire rods; annual capacity, 18,000 tons.—*For description see page 211.*

PENNSYLVANIA—11.

American Steel and Wire Company of New Jersey, Chicago. Six works in Pennsylvania which roll wire rods: Allentown Works, Allentown; annual capacity, 82,000 tons. Braddock Works, Braddock; annual capacity, 80,000 tons. Donora Works, Donora; annual capacity, 200,000 tons. New Castle Works, New Castle; annual capacity, 90,000 tons. Rankin Works, Rankin Station; annual capacity, 100,000 tons. Sharon Works, Sharon; annual capacity, 105,000 tons.—*See pages 42–4.*

Carpenter Steel Company, Reading. Steel wire rods.—*See page 222.*

Milesburg Iron Works, McCoy-Linn Iron Company, Milesburg. Soft iron wire rods; annual capacity, 1,350 tons.—*See page 244.*

Monessen Plant, Page Woven Wire Fence Company, Monessen. Annual capacity, 35,000 tons.—*See page 270.*

Monessen Works, Pittsburgh Steel Company, Pittsburgh. Works at Monessen. Annual capacity, 150,000 tons.—*See page 142.*

United States (The) Wire and Nail Company, Lewis Block, Pittsburgh. Works at Shousetown. Annual capacity, 30,000 tons.—*Idle and for sale. For a description of these works see page 256.*

KENTUCKY—1.

Ashland Steel Company, Incorporated, Ashland. Annual capacity, 110,000 tons.—*For a description of these works see page 289.*

ALABAMA—1.

Ensley Works, Alabama Steel and Wire Company, Birmingham. Works at Ensley. Annual capacity, 100,000 tons.—*See page 303.*

OHIO—5.

American Steel and Wire Company of New Jersey, Chicago. Four works in Ohio which roll wire rods: American Works, Cleveland; annual capacity, 125,000 tons. Consolidated Works, Cleveland; annual capacity, 95,000 tons. H. P. Works, Cleveland; annual capacity, 60,000 tons. Newburgh Steel Works, Newburgh; annual capacity, 100,000 tons.—*For descriptions of these works see pages 42-4.*

Cuyahoga Falls Plant, Cuyahoga Wire and Fence Company, Cuyahoga Falls. Annual capacity, 25,000 tons.—*See page 323.*

INDIANA—2.

Anderson Works, American Steel and Wire Company of New Jersey, Chicago. Works at Anderson, Indiana. Annual capacity, 75,000 tons.—*See page 42.*

Kokomo Steel and Wire Company, Kokomo. Annual capacity, 75,000 tons.—*For a description of these works see page 333.*

ILLINOIS—4.

Dillon-Griswold Wire Company, Sterling. Annual capacity, 50,000 tons.—*Rod mill idle. See page 337.*

Grand Crossing Works, Grand Crossing Tack Company, Grand Crossing. Annual capacity, 45,000 tons.—*See page 337.*

Joliet Works, The Illinois Steel Company, Rookery Building, Chicago. Works at Joliet. Annual capacity, 290,000 tons.—*For a description of these works see page 28.*

Waukegan Works, American Steel and Wire Company of New Jersey, Chicago. Works at Waukegan. Annual capacity, 131,000 tons.—*For a description of these works see page 46.*

COLORADO—1.

Minnequa Rolling Mills and Steel Works, The Colorado Fuel and Iron Company, Denver. Works at Pueblo. Annual capacity, 240,000 tons.—*For a description of these works see page 172.*

UNITED STATES.

Total number of plants in the United States in June, 1904, which were equipped to roll iron and steel wire rods: 33.

Total in November, 1901: 32 completed, 4 building, one rebuilding, and one projected.

IRON AND STEEL SKELP MILLS.

A complete list of mills which are equipped for rolling iron and steel skelp is given below. A number of the works named also roll iron and steel plates and sheets. Capacities when given are in tons of 2,240 pounds.

MASSACHUSETTS—1.

Mount Hope Iron Company, Somerset. Skelp iron, etc.—*For a complete description of these works see page 191.*

NEW YORK—2.

Breaker Island Works, American Steel and Wire Company of New Jersey, Chicago. Works on Breaker Island, opposite Troy, New York. Steel skelp.—*Idle. See page 43.*

Cohoes Rolling Mill Company, Cohoes. Skelp iron.—*See page 200.*

NEW JERSEY—1.

West Jersey Tube Works, Philadelphia. Works at Bridgeton, New Jersey. Skelp iron; annual capacity, 12,000 tons.—*See page 212.*

PENNSYLVANIA—47.

Atlantic Works, (operated by the Atlantic Iron and Steel Company,) New Castle. Skelp iron. Controlled by the Republic Iron and Steel Company, Chicago.—*See page 84.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. Skelp iron, etc.—*See page 221.*

Blandon Rolling Mill, Simon Seyfert, Blandon. Grooved pipe skelp; annual capacity, 20,000 tons.—*See page 221.*

Byers (A. M.) Company, Pittsburgh. Works on the South Side. Skelp iron, all consumed by the company in the manufacture of wrought pipe; annual capacity, 16,000 tons.—*See page 248.*

Carnegie Steel Company, Carnegie Building, Pittsburgh. Three mills in Pennsylvania which roll skelp: Clark Mill, Pittsburgh; steel skelp. Greenville Mill, Greenville; iron and steel skelp. Painter Mill, South Side, Pittsburgh; steel skelp.—*See pages 10, 12, and 14.*

Carnegie Tube Company, Carnegie. Skelp iron; annual capacity, 30,000 tons.—*For sale. See page 248.*

Clearfield Steel and Iron Company, Pittsburgh. Works at Centre. Skelp iron; annual capacity, 18,000 tons.—*See page 267.*

Combination (The) Steel and Iron Company, Chester. Iron and steel skelp.—*Idle and for sale or lease. See page 228.*

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken. Flue iron.—*See page 222.*

Crum Lynne Iron and Steel Company, John Graham, Receiver, Crum Lynne. Works at Eddystone Station. Skelp iron for boiler tubes; annual capacity, 12,000 tons.—*See page 228.*

Eleanor (The) Iron and Steel Company, Irwin. Skelp iron; annual capacity, 30,000 tons.—*Idle and for sale. See page 267.*

Etna Iron and Tube Works, Spang, Chalfant & Co., Incorporated, Pittsburgh. Works at Etna. Pipe iron; annual capacity, 90,000 tons.—*See page 250.*

Exeter Rolling Mill, Exeter Iron Company, Philadelphia. Works at Reading. Skelp iron.—*See page 223.*

Gibraltar Iron Works, Simon Seyfert, Reading. Boiler tube and pipe iron.—*See page 224.*

Harrisburg Pipe and Pipe Bending Company, Harrisburg. Skelp iron and steel.—*See page 237.*

Harrisburg Rolling Mill Company, Harrisburg. Skelp iron; annual capacity, 30,000 tons.—*See page 237.*

Hollidaysburg Iron and Nail Company, Hollidaysburg. Skelp iron. —*See page 243.*

Hughes & Patterson, Richmond street and Susquehanna avenue, Philadelphia. Skelp iron.—*See page 213.*

Juniata Rolling Mill, The Eleanor Iron Company, Hollidaysburg. Main office, Tyrone. Grooved skelp iron.—*See page 243.*

Keystone Rolling Mill, John L. McCutcheon and Thomas G. McCutcheon, owners, Pittsburgh. Works at Soho. Iron and steel skelp.—*Idle and for sale or lease. See page 251.*

Lebanon Iron and Steel Company, Lebanon. Skelp, etc.—*See page 238.*

Logan Iron and Steel Company, Burnham. Skelp.—*For a description of these works see page 243.*

Longmead Iron Company, Conshohocken. Grooved skelp iron; annual capacity, 20,000 tons.—*See page 225.*

National Tube Company, Pittsburgh. Four mills in Allegheny county which roll skelp: Boston Iron and Steel Works, McKeesport; iron and steel skelp; annual capacity, 45,000 tons. Elba Rolling Mills, Pittsburgh; iron and steel skelp; annual capacity, 40,000 tons. National Rolling Mills, McKeesport; charcoal and wrought iron and steel skelp; annual capacity, 240,000 tons. Republic Iron Works, Pittsburgh; iron and steel skelp, etc.; annual capacity, 40,000 tons.—*See page 35.*

Parkesburg (The) Iron Company, Parkesburg. Boiler tube skelp iron; annual capacity, 19,000 tons.—*See page 229.*

Pottsgrove Iron Works, Potts Brothers Iron Company, Limited, Pottstown. Pipe and flue iron.—*See page 226.*

Reading Iron Company, Reading. Four mills which roll skelp

iron: Montour Rolling Mills Department, Danville; grooved skelp iron. Ninth Street Mills Department, Reading; skelp iron. Oley Street Mills Department, Reading; skelp iron; annual capacity, 35,000 tons. Sheet Mill Department, Reading; sheared skelp iron. —*See page 125.*

Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading. Works at Seyfert Station. Iron boiler-tube skelp, pipe skelp, etc.; annual capacity, 15,000 tons.—*Idle and for sale. For a description of these works see page 226.*

Shoenberger Works, American Steel and Wire Company of New Jersey, Chicago. Works at Pittsburgh, Pa. Basic open-hearth steel skelp.—*See page 45.*

Susquehanna Iron and Steel Company, Columbia. Three mills: Columbia Mill, Columbia; skelp and tube iron. Union Street Mill, Columbia; skelp iron. York Mill, York; skelp iron.—*See page 128.*

Tidewater Steel Company, Chester. Works at Thurlow Station. Steel skelp, etc.—*See page 230.*

Tyler (The) Tube and Pipe Company, Washington. Charcoal skelp iron, used by the company in the manufacture of boiler tubes; annual capacity, 21,000 tons.—*See page 272.*

Tyrone Forges, The Tyrone Iron Company, Tyrone. Office, Harrisburg. Sheared and grooved rolled iron and steel skelp; specialty, knobbled charcoal iron boiler-tube skelp; annual capacity, 16,000 tons.—*See page 245.*

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg. Skelp iron and steel.—*See page 256.*

Viaduct Iron Works, Worth Brothers Company, Coatesville. Boiler tube skelp. (Operated by the Coatesville Rolling Mill Company.) —*See page 130.*

West End Rolling Mill Company, Lebanon, Lebanon county. Skelp iron.—*See page 239.*

Wheatland Rolling Mill, Shenango Iron and Steel Company, Wheatland. Skelp iron.—*For a description of these works see page 263.*

WEST VIRGINIA—4.

Riverside Skelp Mills, National Tube Company, Pittsburgh. Works at Benwood, West Virginia. Steel skelp; annual capacity, 200,000 tons.—*See page 36.*

Wheeling Steel and Iron Company, Wheeling. Two works in West Virginia which roll skelp: Belmont Works, Wheeling; grooved skelp; annual capacity, 120,000 tons. Benwood Works, Benwood; iron and steel skelp; annual capacity, 45,000 tons.—*See page 153.*

Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, West Virginia. Steel skelp, etc.—*See page 152.*

ALABAMA—1.

Alabama Tube and Iron Company, Birmingham Trust and Savings Company, Trustee, Birmingham. Works at Helena. Skelp iron. —*Plant idle; company may be reorganized. See page 303.*

OHIO—4 COMPLETED AND 1 PROJECTED.

Andrews Works, Republic Iron and Steel Company, Chicago. Works at Youngstown. Iron and steel skelp.—*See page 84.*

Lorain Works, The National Tube Company, (of Ohio,) Lorain. May roll skelp.—*See page 32.*

Steubenville Works, La Belle Iron Works, Steubenville. Steel skelp, etc.—*See page 151.*

Warren Mill, Carnegie Steel Company, Pittsburgh. Works at Warren, Ohio. Skelp iron, etc.—*See page 15.*

Youngstown Works, The Youngstown Iron Sheet and Tube Company, Youngstown. Skelp iron and steel.—*See page 311.*

ILLINOIS—1 COMPLETED AND 1 PROJECTED.

Aermotor Company, Chicago. May add to its plant at Chicago Heights a department for rolling skelp, etc.—*See page 341.*

Western Tube Company, Kewanee. Skelp, used by the company in the manufacture of wrought iron and steel pipe; annual capacity, 75,000 tons.—*For a description of these works see page 341.*

UNITED STATES.

Total number of iron or steel skelp plants in the United States in June, 1904: 61 completed and 2 projected.

Total number in November, 1901: 60 completed and 2 building.

IRON AND STEEL PLATE AND SHEET MILLS.

Mills which are equipped for making hot-rolled boiler plates, ship plates, nail plates, tack plates, shovel plates, etc., are included in this list. 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 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 black plates or sheets for tinning will be found beginning on page 428.

MASSACHUSETTS—3.

Mount Hope Iron Company, Somerset. Iron tack and shovel plate, nail plate, etc.—*See page 191.*

Stanley (The) Works, Bridgewater. Bessemer and open-hearth nail and tack plate.—*See page 191.*

Tremont Nail Company, West Wareham. "Percha" plates for nails and tacks.—*For a description of these works see page 192.*

CONNECTICUT—1.

American (The) Tube and Stamping Company, Bridgeport. Plate and sheet steel.—*For a description of these works see page 194.*

NEW YORK—4.

Chrome Steel Works, Brooklyn. Chrome steel and iron 5-ply plates for safes, jails, etc.—*To be dismantled. See page 200.*

Elmira Steel Works, E. B. Leaf & Co., Philadelphia. Works at Elmira, New York. Universal steel plates from 6 to 30 inches wide and of any thickness.—*See page 201.*

Lackawanna Steel Company, West Seneca, (post-office address, Buffalo.) Works at Lackawanna. Universal plates up to 48 inches wide and shear plates up to 80 inches wide.—*See page 102.*

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 147.*

NEW JERSEY—3.

American Sheet Iron Company, Phillipsburg. Best qualities of sheet iron and sheet steel for stamping and enameling.—*See page 207.*

Chrome Steel Works, Chrome. Telegraph address, Carteret. Chrome steel plates, etc.—*See page 207.*

Passaic Steel Company, Paterson. Universal mill plates, etc.—*See page 209.*

PENNSYLVANIA—82.

Alcania (The) Company, Pittsburgh. Works at Avonmore. Sheets. —*See page 266.*

Allegheny Steel and Iron Company, Pittsburgh. Works at Avenue. Telegraph address, Tarentum. Sheet steel.—*See page 247.*

American Sheet and Tin Plate Company, Pittsburgh. Ten mills in Pennsylvania which roll plates and sheets: Hyde Park Works, Hyde Park; fine grades of soft steel sheets for stamping, japanning, tinning, galvanizing, and armatures, double-annealed and cold-rolled, and cold-rolled and annealed finishes. Leechburg Works, Leechburg; steel sheets. Pittsburgh Works, New Kensington; soft stamping sheets. Saltsburg Works, Saltsburg; fine sheet iron. Scottdale Works No. 1, Scottdale; black steel sheets. Scottdale Works No. 2, Scottdale; sheet iron. Sharon Works, Sharon; black sheets. United States Works, Demmler (eighth ward, McKeesport); refined and cold-rolled black sheet iron and Bessemer and open-hearth steel sheets. Vandergrift Works, Van-

dergrift; black and galvanized sheets. Wood's Works, McKeesport; light plates and sheet iron and sheet steel, both black and planished; specialty, patent planished sheet iron.—*See pages 53-61.*

Anchor Mills, Neal Brothers, lessees, Pittsburgh. Works on South Side. Special electric steel sheets and sheet iron.—*See page 247.*

Anchor Nail and Tack Works and Central Expanded Metal Company, Chess Brothers, Pittsburgh. Works at Rankin Station. Light steel plates for straps, nails, tacks, stamping, and die work. —*See page 247.*

Bethlehem Steel Company, South Bethlehem. Forged armor plate. —*See page 91.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. Nail plate.—*See page 221.*

Cambria Steel Company, Philadelphia. Works at Johnstown. Steel plates.—*See page 136.*

Canonsburg Steel and Iron Works, Canonsburg. Steel and iron sheets for stamping, enameling, deep drawing, tinning, galvanizing, etc.—*See page 267.*

Carbon Steel Company, Pittsburgh. Open-hearth steel universal and sheared plates.—*See page 248.*

Carnegie Steel Company, Pittsburgh. Four mills in Pennsylvania which roll plates: Homestead Steel Works, Munhall; steel boiler, ship, tank, universal, and armor plates. Lower Union Mills, Pittsburgh; sheared plates, etc. South Sharon Works, Sharon; universal plates. Upper Union Mills, Pittsburgh; steel universal plates, etc.—*See pages 12, 13, and 15.*

Central Iron and Steel Company, Harrisburg. Two mills at Harrisburg which roll plates: Central Iron Works; boiler plate, marine and locomotive steel, ship plates, universal bridge and structural plates, tank steel, and iron plates. Paxton Rolling Mills; steel plates of all kinds.—*See page 134.*

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) lessees, Harrisburg. Iron and steel nail plate.—*See page 236.*

Coatesville Department, Saxton Furnace Company, William H. Staake, Trustee in Bankruptcy, Philadelphia. Works at Coatesville. Iron and steel plates.—*Idle and for sale. See page 228.*

Colonial Steel Company, Pittsburgh. Works at Colonia. Crucible sheets, plates, saw plates, etc.—*See page 260.*

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken. Sheet, flue, and plate iron of all kinds; corrugated iron a specialty.—*See page 222.*

Crucible Steel Company of America, Pittsburgh. Five mills in Pennsylvania which roll plates and sheets: Aliquippa Steel Works, Aliquippa; special qualities of plate and sheet steel. Black Dia-

mond Steel Works, (operated by the Park Steel Company,) Pittsburgh; steel plates and sheets. Howe, Brown & Co. Works, Pittsburgh; crucible steel sheets and plates and open-hearth steel plates for boilers, hulls of vessels, etc. Pittsburgh Steel Works, McKees Rocks; crucible and open-hearth saw, sheet, and plate steel, etc. Singer, Nimick & Co. Works, Pittsburgh; saw, sheet, and plate steel, etc.—*See pages 144-47.*

Danville Bessemer Company, Philadelphia. Works at Danville. Plates for sale and for the consumption of the company.—*Idle and for sale. See page 231.*

Duncannon (The) Iron Company, Duncannon. Office, 122 Race st., Philadelphia. Iron and steel nail plate.—*See page 232.*

Easton Sheet Iron Works, Jackson Rolling Mill Company, Easton. Steel and refined iron sheets.—*See page 218.*

Frankford Steel Company, lessee, New York. Works at Frankford, Philadelphia. Hammered and rolled steel sheets for tools, saws, knives, files, etc.—*See page 213.*

Gibraltar Iron Works, Simon Seyfert, Reading. Boiler plate and boiler tube and pipe iron.—*See page 224.*

Glasgow Iron Company, Pottstown. Two works at Pottstown which roll plates: Glasgow Iron and Steel Works; iron and steel bridge, tank, and boiler plate, flanged and dished boiler heads, manholes, man-hole saddles for boilers, buckle plates, etc. Pottstown Iron Works; boiler, ship, bridge, and tank plates; universal plates 36 inches wide can be rolled.—*See page 127.*

Glendale Mill, Lucknow Iron and Steel Company, lessee, Harrisburg. Works at Pine Iron Works P. O. Telegraph address, Manatawny Station. Iron and steel plates.—*See page 224.*

Griffiths (The W. H.) Company, Incorporated, Washington. Works at Waynesburg. Sheets.—*See page 268.*

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg. Iron and steel nail plate.—*See page 243.*

Hussey-Binns Shovel Company, Pittsburgh. Works at Charleroi. Crucible cast steel, used by the company in making shovels, spades, and scoops.—*See page 268.*

Jessop Steel Company, 91 John st., New York. Works at Washington, Pa. Crucible sheet and saw steel.—*See page 269.*

Jones and Laughlin Steel Company, Pittsburgh. Two works in Pennsylvania which roll plates or sheets: American Iron and Steel Works, South Side, Pittsburgh; plates, sheets, etc. Soho Department, Pittsburgh; steel plates.—*See pages 138-39.*

Keystone Nail Works, Ellis and Lessig Steel and Iron Company, Limited, Pottstown. Iron and steel shovel, tack, and nail plate. —*See page 225.*

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, and sheet steel for other purposes.—*See page 113.*

Lalance and Grosjean Manufacturing Company, Harrisburg. Main office, 19 Cliff st., New York. Sheet steel.—*See page 237.*

Lebanon Iron and Steel Company, Lebanon. Boiler plates, sheets, etc.—*See page 238.*

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 boiler heads and patent hydraulic-pressed boiler braces.—*See page 132.*

McClure (The) Company, Pittsburgh and Philadelphia. Works at Washington. Sheets.—*See page 270.*

Milton Nail Works, F. A. Godcharles Company, Milton. Iron and steel nail plate.—*See page 233.*

Myers (The H. M.) Company, Beaver Falls. Rolled shovel blanks, used by the company in its shovel works.—*See page 261.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. Iron and steel nail plate.—*See page 233.*

Pencoyd Iron Works, A. and P. Roberts Company, operators, Philadelphia. Works in Montgomery county. Steel plates. Controlled by the American Bridge Company.—*See page 66.*

Pennsylvania (The) Steel Company, Philadelphia. Works at Steelton. Bessemer steel plates, open-hearth steel boiler plates, etc. —*See page 119.*

Pottsgrove Iron Works, Potts Brothers Iron Company, Limited, Pottstown. Boiler plate and tank, flue, and pipe iron. Specialties, pipe and flue iron.—*See page 226.*

Republic Iron Works, National Tube Company, Pittsburgh. Works, South Side, Pittsburgh. Iron and steel plates.—*See page 35.*

Russell (J. C.) Shovel Company, Pittsburgh. Works at Aliquippa. Shovel blanks, all consumed by the company.—*See page 262.*

Sable Iron Works, Zug & Co., Limited, Pittsburgh. Steel and iron sheets for corrugating, galvanizing, and stamping; also sheets for expanded metal and electrical work. Corrugated sheets are also made.—*See page 254.*

Sharon Works, Republic Iron and Steel Company, Chicago. Works at Sharon, Pa. Tank iron, etc.—*See page 87.*

Sheet Mill Department, Reading Iron Company, Reading. Plate iron.—*See page 125.*

Shoenberger Works, American Steel and Wire Company of New Jersey, Chicago. Works at Pittsburgh. Basic open-hearth steel plates, sheet steel, etc.—*See page 45.*

Sligo Rolling Mills, Sligo Iron and Steel Company, Connellsville. Iron and steel sheets from No. 9 to No. 20 gauge and iron and steel plates No. 8 gauge and heavier.—*See page 271.*

Stanford Rolling Mills, E. Stanford, lessee, Conshohocken. Sheets, etc.—*See page 226.*

Tidewater Steel Company, Chester. Works at Thurlow Station. Fire-box, and boiler, ship, and tank plates.—*See page 230.*

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg. Boiler, sheet, and tank iron and steel.—*See page 256.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Sheet iron and steel.—*See page 272.*

Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Crucible steel plates.—*See page 257.*

West Leechburg Steel Company, Pittsburgh. Works at West Leechburg. Hot and cold rolled strip steel for stamping, blanking, and drawing.—*See page 272.*

Wheatland Rolling Mill, Shenango Iron and Steel Company, Wheatland. Iron and steel universal plates.—*See page 263.*

Wilkes Rolling Mill Company, Sharon. Sheet iron.—*See page 264.*

Williamsport Iron and Nail Company, Williamsport. Iron and steel nail plate.—*See page 234.*

Wood (Alan) Iron and Steel Company, Philadelphia. Two works in Pennsylvania which roll plates and sheets: Ivy Rock Steel Works, Ivy Rock; universal plates. Schuylkill Iron Works, Conshohocken; sheet, plate, and flue iron and steel.—*See page 131.*

Worth Brothers Company, Coatesville. Two works at Coatesville which roll plates and sheets: Brandywine Rolling Mills; 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 man-holes, saddles, etc. Viaduct Iron Works; iron and steel plates and sheets.—*See pages 129-30.*

Wyoming (The) Shovel Works, Wyoming. Shovel plates and light steel sheets.—*See page 234.*

York Mill, Susquehanna Iron and Steel Company, Columbia. Works at York. Plate iron.—*For a description of these works see page 128.*

DELAWARE—4.

Marshallton Iron and Steel Company, Incorporated, Marshallton. Sheet iron and steel; specialty, corrugated iron.—*See page 275.*

Minquas Iron Works, McCullough Iron Company, Wilmington. Fine sheet steel, black and galvanized, and "Harvey's patent cleaned" sheet iron.—*See page 275.*

Newport Rolling Mills, Marshall Iron Company, Newport. Black sheet iron and sheet steel, Nos. 16 to 28 gauge.—*See page 275.*

Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Charcoal iron boiler plates and plate iron generally. —*For a description of these works see page 276.*

MARYLAND—1.

Taylor (N. and G.) Company, Philadelphia. Works at Cumberland, Maryland. Sheets.—*For description see page 277.*

VIRGINIA—1.

Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle, in the city of Richmond. Nail plate.—*See page 283.*

WEST VIRGINIA—6 COMPLETED AND 1 PROJECTED.

Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Virginia. Large sheets.—*See page 54.*

Crescent Iron Works, (Whitaker Department,) Whitaker-Glessner Company, Wheeling. Iron and steel sheets, galvanized sheets, etc. —*See page 155.*

Jackson (The) Iron and Tin Plate Company, Clarksburg. Security Trust Company, Trustee, Wheeling. Long sheets.—*Idle and for sale. See page 286.*

Ohio Valley Steel and Foundry Company, Robert Miller, Receiver, Pittsburgh. Contemplates adding to its building open-hearth steel plant at Paden City, West Virginia, 3 mills for the manufacture of steel sheets.—*See page 286.*

Parkersburg Iron and Steel Company, Parkersburg. Fine sheet iron and sheet steel.—*See page 286.*

Top Mill, Wheeling Steel and Iron Company, Wheeling. Iron and steel sheets, nail plate, etc.—*See page 154.*

Wheeling Works, La Belle Iron Works, Steubenville, Ohio. Works at Wheeling, W. Va. Nail plate, tack plate, etc.—*See page 152.*

KENTUCKY—6 COMPLETED AND 1 PARTLY ERECTED.

Ashland Sheet Mill Company, Incorporated, Ashland. Black and galvanized sheets of all grades.—*See page 289.*

Licking Rolling Mill Company, Incorporated, Covington. Sheet iron.—*See page 290.*

Louisville Bolt and Iron Company, Incorporated, Louisville. A department for the manufacture of sheets is partly erected but work has been suspended indefinitely.—*See page 290.*

Mitchell-Tranter Works, Republic Iron and Steel Company, Chicago. Works at Covington, Kentucky. Plate iron and steel boiler plate.—*See page 86.*

Newport Rolling Mill Company, Newport. Steel sheets for roofing,

corrugating, and galvanizing purposes.—*For a description of these works see page 290.*

Norton Iron Works, Incorporated, Ashland. Steel nail plate.—*See page 291.*

Tennessee Rolling Mills, Ewald Iron Company, 941 North Second st., St. Louis, Mo. Works at Louisville, Kentucky. Plate and sheet iron, and tank, shell, and flange steel plates.—*See page 289.*

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 182.*

Birmingham Rolling Mills, (operated by the Birmingham Rolling Mill Company,) Birmingham. Iron and open-hearth steel plates and sheets. Controlled by the Republic Iron and Steel Company, Chicago.—*For a description of these works see page 84.*

OHIO—32 COMPLETED AND 2 PROJECTED.

American (The) Rolling Mill Company, Middletown. Black and galvanized sheets, corrugated iron, and sheet steel building materials of all kinds.—*See page 321.*

American Sheet and Tin Plate Company, Pittsburgh. Twelve mills in Ohio which roll plates and sheets: Aetna-Standard Works, Bridgeport; black sheets and painted and formed roofing. Canton Works, Canton; iron and steel black sheets for stamping and roofing. Crescent Works, Cleveland; black plates for stamping. Dennison Works, Dennison; common cold-rolled sheets for stamping. Dover Works, Canal Dover; light plates, black and galvanized, painted and formed, and cold-rolled sheet steel. Dresden Works, Dresden; iron and steel sheets. Falcon Works, Niles; sheet iron and sheet steel. Guernsey Works, Cambridge; black sheets, painted and formed roofing, and galvanized sheets. New Philadelphia Works, New Philadelphia; light plates, black sheets, and cold-rolled sheet steel. Piqua Works, Piqua; iron and steel sheets. Struthers Works, Struthers; high-grade pickled and finished steel sheets. Wellsville Works, Wellsville; light plate and sheet iron and highly finished sheet steel.—*See pages 53–61.*

Belfont Iron Works Company, Ironton. Nail plate.—*See page 319.*

Canton Crucible Steel Works, Canton. Wire-drawing plates.—*Idle and for sale or lease. See page 322.*

Carnahan Tin Plate and Sheet Company, Canton. Stamping sheets, etc.—*See page 323.*

Cleveland (The) Steel Company, Cleveland. Light steel plates and sheets.—*See page 313.*

Dithridge Steel Car Company, Jersey City, New Jersey. Contem-

plates erecting works at White City, Ohio, for the manufacture of plates, etc.—*See page 327.*

Empire Iron and Steel Company, Niles. Sheet steel specialties, sheets from No. 10 to No. 30 gauge, shovel steel, etc.—*For description see page 309.*

Kelly Nail and Iron Company, Ironton. Steel nail plate.—*For description see page 319.*

Laughlin Department, Whitaker-Glessner Company, Wheeling, West Virginia. Works at Martins Ferry, Ohio. Steel nail plate and sheets.—*See page 155.*

Lorain Works, The National Tube Company, (of Ohio,) Lorain. Will erect one plate and one universal mill.—*See page 32.*

Muskingum (The) Valley Steel Company, Zanesville. Steel sheets, special analysis armature sheets, and corrugated and various other styles of sheet metal roofing.—*See page 325.*

Niles (The) Iron and Sheet Company, Niles. Black sheet steel.—*See page 310.*

Otis (The) Steel Company, Limited, Cleveland. Steel plates.—*See page 314.*

Portsmouth Steel Company, Wheeling, West Virginia. Works at Portsmouth, Ohio. Steel plates.—*See page 319.*

Republic Iron and Steel Company, Chicago. Two mills in Ohio which roll plates: Brown Bonnell Works, Youngstown; universal plates. Mahoning Valley Works, Youngstown; tank and plate iron.—*See pages 85-6.*

Stark Rolling Mill Company, Canton. Black sheets, galvanized sheets, pickled and cold-rolled sheets, etc.—*See page 326.*

Steubenville Works, La Belle Iron Works, Steubenville. Universal plates, specialty plates, etc.—*See page 151.*

Tuscora Works, The United Sheet and Tin Plate Company, Marietta. Works at Newcomerstown. Polished, galvanized, and corrugated sheets.—*See page 150.*

United (The) Steel Company, Canton. Open-hearth steel universal plates.—*See page 326.*

Youngstown (The) Iron and Steel Roofing Company, Youngstown. Sheet iron and sheet steel.—*See page 310.*

Youngstown Works, The Youngstown Iron Sheet and Tube Company, Youngstown. Black and galvanized sheets.—*See page 311.*

INDIANA—4 COMPLETED, 1 BUILDING, AND 1 PROJECTED.

Chicago Steel Manufacturing Company, New Castle. Building works at New Castle to make shovel and nail plate.—*See page 330.*

Elwood Plant, Ames Shovel and Tool Company, Boston, Mass. Works at Elwood, Indiana. Shovel plate.—*See page 331.*

Indiana Harbor Works, Inland Steel Company, Chicago. Works at Indiana Harbor, Indiana. Sheets, light plates, etc.—*See page 163.*

Indiana Rolling Mill Company, New Castle. High-carbon sheet steel for shovel plates.—*See page 332.*

Midland Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Muncie, Indiana. Stamping sheets and plates. —*See page 57.*

Ward-Dickey Steel Company, Indiana Harbor. Now makes hammered sheets. May add hot sheet mills.—*See page 335.*

ILLINOIS—4.

Granite City Rolling Mills, National Enameling and Stamping Company, New York City. Works at Granite City, Illinois. Sheets for stamping, enameling, etc.—*See page 169.*

Hartmann, Hay & Reis, Belleville. Iron and steel nail, tack, and shovel plate.—*See page 338.*

South Works, The Illinois Steel Company, Chicago. Works at South Chicago. Fire-box, and boiler, ship, and tank plate.—*See page 29.*

Steel Department, Simonds Manufacturing Company, Fitchburg, Mass. Works at Chicago. Saw plate and crucible sheet steel.—*See page 340.*

WISCONSIN—2.

Waukesha (The) Sheet Steel Company, Waukesha. Galvanized sheets.—*See page 349.*

West Superior Branch, United States Cast Iron Pipe and Foundry Company, New York City. Works at West Superior, Wisconsin. Bessemer steel plates.—*Idle and for sale or lease. See page 349.*

MISSOURI—1.

St. Louis Rolling Mills, National Enameling and Stamping Company, New York City. Works at St. Louis. Stamping sheet iron for "granite iron ware," galvanizing sheets, etc.—*See page 169.*

COLORADO—1 BUILDING.

Colorado (The) Fuel and Iron Company, Denver. Building works at Pueblo for the manufacture of sheets, etc.—*See page 172.*

CALIFORNIA—1.

Judson Manufacturing Company, Oakland. Office and salesroom, San Francisco. Tack plate, nail plate, etc.—*See page 356.*

UNITED STATES.

Total number of plants in the United States in June, 1904, which were equipped to roll iron and steel plates and sheets: 157 completed, 2 building, one partly erected, and 4 projected.

Total in November, 1901: 153 completed, 7 building, and 1 projected.

BLACK PLATES OR SHEETS FOR TINNING.

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, etc., will be found beginning on page 418.

PENNSYLVANIA—23.

Alcania (The) Company, Pittsburgh. Works at Avonmore. Black plates for tinning.—*See page 266.*

American Sheet and Tin Plate Company, Pittsburgh. Eleven mills in Pennsylvania which make black plates for tinning: Humbert Works, South Connellsville; Hyde Park Works, Hyde Park; Monongahela Works, Pittsburgh; National Works, Monessen; New Castle Works, New Castle; Pennsylvania Works, New Kensington; Pittsburgh Works, New Kensington; Sharon Works, Sharon; Shenango Works, New Castle; Star Works, Pittsburgh; and United States Works, Demmler.—*For complete descriptions of all these works see pages 53–61.*

Anchor Mills, Neal Brothers, lessees, Pittsburgh. Works on the South Side. Black plates for tinning.—*See page 247.*

Canonsburg Steel and Iron Works, Canonsburg. Steel and iron sheets for tinning.—*See page 267.*

Griffiths Charcoal Iron Mills, Washington. Black plates for tinning.—*See page 268.*

Griffiths (The W. H.) Company, Incorporated, Washington. Works at Waynesburg. Black plates for tinning.—*See page 268.*

Lalance and Grosjean Manufacturing Company, Harrisburg. Main office, 19 Cliff street, New York. Black plates for tinning.—*For description see page 237.*

McClure (The) Company, Pittsburgh and Philadelphia. Works at Washington. Black plates for tinning.—*See page 270.*

Port Vue Mills, McKeesport Tin Plate Company, McKeesport, Pa. Works at Port Vue. Black plates for tinning.—*See page 254.*

Sable Iron Works, Zug & Co., Limited, Pittsburgh. Black plates for tinning.—*See page 254.*

Standard Tin Plate Company, Canonsburg. Black plates for tinning.—*See page 271.*

Stanford Rolling Mills, E. Stanford, lessee, Conshohocken. Black plates for tinning.—*See page 226.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Black plates for tinning.—*For a description of these works see page 272.*

MARYLAND—1.

Taylor (N. & G.) Company, Philadelphia. Works at Cumberland, Maryland. Black plates for tinning.—*For description see page 277.*

WEST VIRGINIA—6 COMPLETED AND 1 BUILDING.

American Sheet and Tin Plate Company, Pittsburgh. Two mills in West Virginia which make black plates for tinning: Chester Works, Chester, (post-office address, East Liverpool, Ohio,) and La Belle Works, Wheeling.—*See pages 54 and 57.*

Crescent Iron Works, (Whitaker Department,) Whitaker-Glessner Company, Wheeling. Black plates for tinning.—*For description see page 155.*

Follansbee Brothers Company, Pittsburgh. Building works at Mahans, (post-office address, Wellsburg,) West Virginia, for the manufacture of black plates for tinning.—*For a description of these works see page 285.*

Jackson (The) Iron and Tin Plate Company, Clarksburg. Security Trust Company, Trustee, Wheeling. Black plates for tinning. —*Idle and for sale. See page 286.*

Morgantown Tin Plate Company, Frank P. Corbin, Trustee, Morgantown. Black plates for tinning.—*For sale. For description see page 286.*

Parkersburg Iron and Steel Company, Parkersburg. Black plates for tinning.—*For a description of these works see page 286.*

KENTUCKY—1.

Licking Rolling Mill Company, Incorporated, Covington. Black plates for tinning for its own use.—*For description see page 290.*

OHIO—10.

American Sheet and Tin Plate Company, Pittsburgh. Six mills in Ohio which make black plates for tinning: Beaver Works, Lisbon; Cambridge Works, Cambridge; Crescent Works, Cleveland; Dennison Works, Dennison; Falcon Works, Niles; and Laughlin Works, Martins Ferry.—*See pages 54-7.*

Carnahan Tin Plate and Sheet Company, Canton. Black plates for tinning.—*See page 323.*

Pope Tin Plate Company, Wheeling, West Virginia. Works at Steubenville, Ohio. Black plates for tinning.—*For a description of these works see page 329.*

United (The) Sheet and Tin Plate Company, Marietta. Two works in Ohio which make black plates for tinning: Marietta Works, Marietta, and Tuscora Works, Newcomerstown.—*See page 150.*

INDIANA—5 COMPLETED AND 1 BUILDING.

American Sheet and Tin Plate Company, Pittsburgh. Four mills in Indiana which make black plates for tinning: American Works, Elwood; Anderson Works, Anderson; Irondale Works, Middletown; and Morewood Works, Gas City.—*For complete descriptions of these works see pages 54, 56, and 58.*

Atlanta Rolling Mill and Tin Plate Company, Atlanta. Building works at Atlanta, Hamilton county, for the manufacture of black plates for tinning.—*Will probably be completed and in operation in August, 1904. See page 330.*

Juniata Steel and Iron Company, Greencastle. Black plates for tinning.—*For a description of these works see page 332.*

ILLINOIS—1.

Granite City Rolling Mills, National Enameling and Stamping Company, New York City. Works at Granite City, Illinois. Black plates or sheets for stamping, enameling, and tinning.—*For a description of these works see page 169.*

MISSOURI—1.

St. Louis Rolling Mills, National Enameling and Stamping Company, New York. Works at St. Louis, Missouri. Black plates for tinning.—*For a description of these works see page 169.*

WISCONSIN—1.

Waukesha (The) Sheet Steel Company, Waukesha. Black plates for tinning.—*For a description of these works see page 349.*

COLORADO—1 BUILDING.

Colorado (The) Fuel and Iron Company, Boston Building, Denver. Building works at Pueblo for the manufacture of black plates for tinning.—*For a description of the works see page 172.*

UNITED STATES.

Total number of rolling mills and steel works in the United States in June, 1904, which were equipped for the manufacture of black plates or sheets for tinning: 49 completed and 3 building.

Total in November, 1901, which were similarly equipped: 46 completed, 6 building, and one projected.

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 and show rooms, 204–6 Varet st., Brooklyn; factories, Flushing, Bushwick, and Evergreen aves., and Cook, White, and Varet sts., Brooklyn. New York office and show rooms, 2–6 Cliff st. Tinning plant erected about 1876 and since greatly enlarged; product chiefly used by the company in its own works in the manufacture of milk cans, enameled ware, stamped ware, steel tanks and drums, soda-water tanks, and ice-cream cans. Fuel, oil and coal. Buys black plates. Robert Seaman, President; E. C. Seaman, Secretary and Treasurer.

Meurer Brothers Company, 569–77 Flushing avenue, Brooklyn. Built in 1894; first tinplates and terne plates made in March, 1894; 8 sets; now makes terne plates only; weekly capacity, 2,000 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "Florida" and "Howard" for charcoal and "Albert" and "Brooklyn" for coke; for terne plates, "Excelsior," "Flushing," "Grace," "Meurer's Genuine Tinned Iron Sheets," "Meurer's Old Method," "Meurer's Roofing," "Pullman," "Liberty," and "Superior." Buys black plates.

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, Westmoreland county, 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, coal. Brand, "Avon." Makes black plates.—*See Rolling Mills and Steel Works, page 266.*

Anchor Mills, Neal Brothers, lessees, 421 Wood street, Pittsburgh. Works on Nineteenth st., South Side. Tinning plant added to a rolling mill in 1900 and first terne plates made November 26, 1900; one set; product, terne plates and lead-coated sheets; can make plates 40 inches wide by 120 inches long; weekly capacity, 600 boxes of 225 pounds each. Fuel, natural gas. Brand, "Anchor." Make black plates. (Land and buildings owned by Chess Brothers.)—*See Rolling Mills and Steel Works, page 247.*

Cadwallader (The) Tin Plate and Metal Company, Elizabeth st. and B. & O. R. R., Pittsburgh. Built in 1891 by Griffiths & Cadwallader; first terne plates made December 27, 1891, and first tinplates in June, 1893; three 6-roll sets; product, terne plates only; weekly capacity, 1,150 boxes. Fuel, natural gas and coal. Brands, "Wonder O. Method," "Dixon Old Process," "Optimus American Redipped," "Cadwallader's Redipped," "Cadwallader's Genuine Charcoal Redipped," "Cadwallader Old Style," etc. Buys black plates. G. A. Cadwallader, President and Manager; Samuel Hunt, Vice-President; R. A. Franz, Secretary; F. H. Good, Treasurer.

Ferguson Tin Plate Company, Limited, East Liberty, P. R. R., Pittsburgh. Built in 1895; first terne plates made in July, 1895, and first tinplates made in September, 1895; 3 machines for terne plates; weekly capacity, 500 boxes of 20 x 28-inch terne plates, weighing from 200 to 300 pounds per box. Fuel, coal. Brands, Ferguson's "Redipped," "Extra Coated," "Old Style," "Old Process," "U. S. Old Style," "Magnet," and "Volcano." Buys black plates. L. A. Meyran, Chairman; E. H. Geilfuss, Treasurer; A. C. Ferguson, Superintendent.

Follansbee Brothers Company, Liberty and Short streets, Second and Third aves., Pittsburgh. Works in Allegheny City. Built in 1891-2; first tinplates and terne plates made in January, 1892; 5 sets; product, tinplates and terne plates; weekly capacity, 2,200 boxes. Fuel, coal. Brands: for tinplates, "Finest" and "Clifton" for charcoal and "Furnace" for coke; for terne plates, "Scott's Extra Coated," "Triumph Old Method," "Protection Old Process," "Orbit Redipped," "Old Reliable Redipped," "Duquesne," "Neville Old Style," "Oakmont," "Sherwood," "Pittsburgh," "Raymond," "Allegheny," "Braddock Old Style," "Kenton," "Thurso," "Lionel Old Style," and "Emblem Old Style." Buys black plates. Sales made by the company.—*Plant will be dismantled and part of machinery removed to Mahans, West Virginia, where the company is erecting new works. See pages 285 and 436.*

Griffiths Charcoal Iron Mills, Washington, Washington county. 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. Brands, "Griffiths Charcoal Iron Old Style" and "Griffiths Triple Coated Charcoal Iron Old Style." Make black plates.—*See Rolling Mills and Steel Works, page 268.*

Griffiths (The W. H.) Company, Incorporated, Washington. Works at Waynesburg, Greene county. Built in 1901–2; first tinplates and terne plates made in July, 1902; 4 Thomas & White and 3 Jumbo sets; product, tinplates; weekly capacity, double turn, 4,000 boxes. Fuel, natural gas. Makes black plates. Sales made by the company.—*See Rolling Mills and Steel Works, page 268.*

Hamilton, (John,) near Tecumseh st., 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. Brands, "Hamilton's Best Redipped," "Osceola Old Style," "Bonus," "Fort Pitt," "G. A. R.," "Hamilton's Excelsior Hand Coated," "Hazlewood," "Killbuck," "Lulu," "Mingo" old process and "Hamilton's Best Charcoal Iron Redipped." Buys black plates.

Humbert Works, American Sheet and Tin Plate Company, Pittsburgh. Works at South Connellsville.—*For description see page 62.*

Lalance and Grosjean Manufacturing Company, Harrisburg. Main office, 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; 6 sets for tinplates; weekly capacity, 2,000 boxes. Fuel, bituminous coal. Brand, "L. & G." Makes black plates.—*See Rolling Mills and Steel Works, page 237.*

McClure (The) Company, 211–15 Second ave., Pittsburgh, and 301–5 Florist st., Philadelphia. Works at Washington, Washington county. Built in 1899 and first tinplates and terne plates made January 1, 1900; 9 sets, 3 for tinplates and 6 for terne plates; weekly capacity, 700 boxes of tinplates and 3,500 boxes of terne plates. Fuel, natural gas. Leading brand, "McClure's Genuine Charcoal Iron Redipped." Makes black plates. Sales made by the company. (Formerly operated by the Washington Charcoal-Iron Tin Mills.)—*See Rolling Mills and Steel Works, page 270.*

Merchant & Co., (incorporated,) 517 Arch st., Philadelphia. Branch offices, 247 Water st., New York; 584 Flushing ave., Brooklyn; and 14–28 Michigan st., Chicago. Works on Washington ave., above Twentieth st., Philadelphia. Eight sets; product, tinplates and terne plates. Fuel, coal. Brands: for tinplates, "Palma,"

"Florence," "Edgeware," "Pisa," "Minerva," "Violet," "Leslie," "Spa," and "Rose;" for terne plates, "Merchant's Old Method," "Merchant's Roofing," "Merchant's American Old Style," "Old Style-A," "Old Style-B," "Old Style-C," "Alaska," "Camaret," "Worcester," "Emlyn," "Crescent," "Hickory," "Empire," "Palm," "Elsie," "Kismet," "Stanley," and "Arch;" for pure iron plates, "Merchant's 'Old Fashion' Iron Roofing Plates," "Merchant's 'American Pure' Iron Roofing Plates," and "Merchant's 'Pure Iron' Bright Plates." Buy black plates. Powell Evans, President.

Monongahela Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Pittsburgh.—*For description see page 63.*

National Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Monessen.—*For description see page 63.*

New Castle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Castle.—*For description see page 63.*

Pennsylvania Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*See page 63.*

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. Brands: for tinplates, "H. & P. Best Bright," "Seminole Bright," "Mohawk Bright," and "Cherokee Bright;" for terne plates, "H. & P. Redipped Roofing," "H. & P. Best Roofing," "Delaware Roofing," "Huron Roofing," and "Oneida Roofing." Buy black plates.—*Idle. See Hughes & Patterson, page 213.*

Pittsburgh Works, American Sheet and Tin Plate Company, Pittsburgh. Works at New Kensington.—*For description see page 63.*

Port Vue Mills, McKeesport Tin Plate Company, McKeesport. Works at Port Vue, Allegheny county. Built in 1902–3 and first tinplates made in April, 1903; 19 sets; product, tinplates only; weekly capacity, 10,000 boxes. Fuel, natural gas. Make black plates. Selling agents, Ely and Williams Company, New York.—*See Rolling Mills and Steel Works, page 254.*

Sharon Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at Sharon.—*For a description of these works see page 63.*

Shenango Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at New Castle.—*For a description of these works see page 63.*

Standard Tin Plate Company, Canonsburg, Washington county.

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, 3,000 boxes of tinplates and 2,000 boxes of terne plates. Fuel, natural gas and coal. Makes black plates.—*See Rolling Mills and Steel Works, page 271.*

Star Works, American Sheet and Tin Plate Company, Pittsburgh. Works, foot of Twelfth street, Pittsburgh.—*For description see page 63.*

Taylor (N. and G.) Company's Tinplate Works, N. and G. Taylor Company, Mariner and Merchant Building, southwest cor. Third and Chestnut sts., Philadelphia. Works on Tasker st., from Meadow st. to Swanson st. 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 tin or terne plates. Fuel, coal. Principal brands: for tinplates, "Hand-Dipped," "Brilliant," "Royal," "Merion," "Linden," "Poplar," "Elm," and "Myrtle" for charcoal finish, and "Almond," "Locust," and "Mint" for coke; for terne plates, "Genuine Taylor Old Style," "The Taylor Roofing Tin," "Old Method," "Columbia," "Maple Redipped," "N. E.," "Avalon," "Willow," "Cedar," "Knoxall," "Spruce," and "Globe." Make black plates.—*See Rolling Mills and Steel Works, page 277.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg, Greene county. 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. Brand, "Griffiths Genuine Charcoal Iron." Make black plates.—*See Rolling Mills and Steel Works, page 272.*

United States Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Demmler.—*For description see page 64.*

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 30 inches by 12 feet in size; weekly capacity, 20 to 25 tons. Fuel, bituminous coal. Brand, "Ajax." Buys iron or steel sheets. J. G. Hendrickson, President; G. H. Clamer, Vice-President; J. R. Neison, Secretary and Treasurer.

ALUMINUM-COATED SHEETS.

Steel and Iron Aluminum Coating Company, Connellsville, Fayette county. 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, 6,000 tons. Fuel, coal and natural gas. Expects to double capacity. Buys sheets. George J. Humbert, President and General Manager; H. P. Snyder, Vice-President; W. H. Kirchhoff, Secretary and Treasurer.

Number of tinplate and terne plate works in Pennsylvania: 26. In addition one plant makes flat or corrugated pure lead-coated sheets and one plant makes aluminum-coated steel sheets.

MARYLAND.

Baltimore Branch, National Enameling and Stamping Company, New York. Works at Baltimore, Md.—*See page 169.*

Baltimore Works, American Can Company, Bowling Green Building, 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 of 14 x 20 plates. Fuel, coal. Buy black plates.—*See Maywood Works, page 439.*

Number of tinplate works in Maryland: 2. No terne plate works.

VIRGINIA.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Tinning plant added to a rolling mill in 1894; first tin and terne plates made in November, 1894; 3 sets, one for tinplates and 2 for terne plates; weekly capacity, 350 boxes of tinplates and 700 boxes of 20 x 28 terne plates. Fuel, bituminous coal. Brands: for tinplates, "Belle Isle" and "Belmont" for charcoal and "Bellevue" and "Belona" for coke; for terne plates, "Chesapeake," "Cherokee," "Mohawk," "Pawnee," "Potomac," "Albemarle," "Greenbrier," "Kanawha," "Rivanna," "Indian," and "York." Buy black plates. Sales made by the company.—*See Rolling Mills and Steel Works, page 283.*

Number of tinplate and terne plate works in Virginia: one.

WEST VIRGINIA.

Chester Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Chester, West Virginia. Post-office address, East Liverpool, Ohio.—*For description see page 62.*

Follansbee Brothers Company, Liberty and Short streets, Second and Third aves., Pittsburgh. Commenced building works at Mahans, Brooke county, (post-office address, Wellsburg,) W. Va., in 1903 for the manufacture of tinplates and terne plates; will

probably be completed in the fall of 1904; to be equipped with 10 sets, 5 for tinplates and 5 for terne plates; estimated weekly capacity, 3,000 boxes of tinplates and 3,000 boxes of terne plates. Fuel, natural and manufactured gas. Brands: for tinplates, "Finest" and "Clifton" for charcoal and "Furnace" for coke; for terne plates, "Scott's Extra Coated," "Triumph Old Method," "Protection Old Process," "Old Reliable Redipped," "Duquesne," "Neville Old Style," "Raymond," "Allegheny," "Braddock Old Style," and "Lionel Old Style." Sales made by the company. Building works to make black plates.—*See Rolling Mills and Steel Works, page 285, and Tinplate and Terne Plate Works, page 432.*

Jackson Iron and Tin Plate Works, The Jackson Iron and Tin Plate Company, Clarksburg, Harrison county. Security Trust Company, Trustee, Wheeling. Built in 1901–2; first tinplates made in August, 1902; 12 sets, 5 Jumbo and seven 6-roll machines; product, tinplates only; weekly capacity, 5,000 boxes. Fuel, natural gas. Make black plates.—*Idle; advertised to be sold on July 9, 1904. See Rolling Mills and Steel Works, page 286.*

La Belle Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Wheeling, West Virginia.—*For a description of these works see page 62.*

Morgantown Tin Plate Company, Frank P. Corbin, Trustee, Morgantown, Monongalia county. Partly built by the Rolling Mill Company of America in 1902; practically completed by the Morgantown Tin Plate Company in 1903–4; not put in operation down to May 15, 1904; 8 sets for tinplates or for terne plates. Fuel to be used, coal, coke, and natural gas. Equipped to make black plates.—*For sale. See Rolling Mills and Steel Works, page 286.*

Wheeling Corrugating Company, Wheeling. (Controlling interest owned by the Whitaker-Glessner Company.)—*See page 155.*

Number of tinplate and terne plate works in West Virginia: 5 completed and one building. No projected plants.

KENTUCKY.

Licking Iron Works, Licking Rolling Mill Company, Incorporated, Covington, Kenton county. Tinning plant added to a rolling mill in 1895; first terne plates made in March and first tinplates in June, 1895; 4 sets, one for tinplates and 3 for terne plates; weekly capacity, 185 boxes of 20 x 28 tinplates and 555 boxes of 20 x 28 terne plates, 200 lbs. to the box. Fuel, coal. Brands, "M. F. H. Best," "M. F. H. Extra," and "M. F. H." Make black plates.—*Idle. See Rolling Mills and Steel Works, page 290.*

Number of tinplate and terne plate works in Kentucky: one.

OHIO.

Beaver Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at Lisbon, Ohio.—*See page 62.*

Carnahan Tin Plate and Sheet Company, Canton, Stark county. Built in 1901 and first tinplates and terne plates made in December, 1901; 10 sets, 7 for terne plates, 2 for coke plates, and one for charcoal plates; weekly capacity, 4,500 boxes of terne plates, 500 boxes of charcoal plates, and 1,000 boxes of coke plates. Fuel, coal. Makes black plates.—*See Rolling Mills and Steel Works, page 323.*

Crescent Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Cleveland, Ohio.—*For description see page 62.*

Falcon Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Niles, Ohio.—*For description see page 62.*

Laughlin Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Martins Ferry, Ohio.—*See page 62.*

McDonald (The James) and Sons Company, Cincinnati. Built in 1894 and first terne plates made in August, 1894; 2 sets; product, redipped terne plates; weekly capacity, 300 boxes of 20 x 28 plates. Fuel, coal. Brands, "Eureka," "Special Redipped," "The James McDonald and Sons Co. Old Style," "Cadot's Old Style," "Clyde," "Reinert Redipped," and "Enders Old Style." Formerly bought black plates, but now makes redipped terne plates only. James McDonald, Sr., President; Henry McDonald, Vice-President; Edward McDonald, Secretary; James McDonald, Jr., Treasurer.

Marietta Works, The United Sheet and Tin Plate Company, Marietta.—*For description see page 150.*

Pope Tin Plate Company, Wheeling, W. Va. Branch office, 421 Wood st., Pittsburgh. Works at Steubenville, Jefferson county, Ohio. Built in 1901–2 and first tinplates made in July, 1902; terne plates not made down to May 15, 1904; 16 sets (three 6-roll single and one 8-roll single Thomas & White and 12 double Elwood); product, tinplates and terne plates. Fuel, natural gas. Makes black plates. Sales made by the company.—*See Rolling Mills and Steel Works, page 329.*

Number of tinplate and terne plate works in Ohio: 8.

INDIANA.

American Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at Elwood, Indiana.—*See page 61.*

Anderson Works, American Sheet and Tin Plate Company, Pittsburgh. Works at Anderson, Indiana.—*See page 62.*

Juniata Steel and Iron Company, Greencastle, Putnam county. 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, 4,300 boxes of tinplates and 1,200 boxes of terne plates. Fuel, coal. Brand, "Juniata." Makes black plates.—*See Rolling Mills and Steel Works, page 332.*

Morewood Works, American Sheet and Tin Plate Company, Frick Building, Pittsburgh. Works at Gas City, Grant county, Indiana.—*For a description of these works see page 63.*

PROJECTED.

Atlanta Rolling Mill and Tin Plate Company, Atlanta, Hamilton county. May erect a plant at Atlanta for the manufacture of tinplates and terne plates. Now building works to make black plates.—*See Rolling Mills and Steel Works, page 330.*

Number of tinplate and terne plate works in Indiana: 4 completed and one projected. No building plants.

ILLINOIS.

Maywood Works, American Can Company, Bowling Green Building, New York. Works at Maywood, Cook county, Illinois. Built in 1891; 18 Norton automatic tinning sets; product, tinplates, all consumed by the company in the manufacture of tin cans; weekly capacity, 11,000 boxes of 14 x 20 plates. Fuel, coal. Buy black plates.—*See Baltimore Works, page 436.*

Sturges and Burn Manufacturing Company, Harrison and Green sts., Chicago. Branch offices, 316 Robert st., St. Paul, Minnesota, and 409-11 Grand ave., Kansas City, Missouri. 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, oil. Buys black plates. Frank Sturges, President; Lee Sturges, Vice-President; William H. Burn, Secretary; Charles H. Baker, Treasurer. (Formerly operated by the Sturges, Cornish, and Burn Company.)

Number of tinplate works in Illinois: 2. No terne plate works.

MICHIGAN.

Buhl Stamping Company, Detroit, Wayne county. 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. Theo. D. Buhl, Presi-

dent; Charles H. Jacobs, Vice-President and Manager; D. C. Delamater, Secretary; J. M. Thurber, Treasurer; Thomas W. Forster, Superintendent.

Number of tinplate works in Michigan: one. No terne plate works.

MISSOURI.

St. Louis Tinplate Works, National Enameling and Stamping Company, New York. Works at St. Louis, Mo.—*See page 169.*

Number of tinplate and terne plate works in Missouri: one.

COLORADO.

Colorado (The) Fuel and Iron Company, Boston Building, Denver. Building works at Pueblo for the manufacture of tinplates and terne plates.—*For description see page 173.*

Number of tinplate and terne plate works in Colorado: one building.

UNITED STATES.

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 are 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 are being built, and one plant for the manufacture of tinplates and terne plates is projected. 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.

Total number of tinplate and terne plate works in the United States in November, 1901: 55 completed, 7 building, and one projected. Of these 9 were equipped for the manufacture of tinplates only and one plant for the manufacture of tinplates only was being built; 5 were equipped for the manufacture of terne plates only and 2 plants for the manufacture of terne plates only were being built; and 41 were equipped for the manufacture of both tinplates and terne plates, 4 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.

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 August 1, 1904.

PART I—CHIEFLY CONSOLIDATIONS.

THE UNITED STATES STEEL CORPORATION.

American Bridge Company; Pittsburgh office, Frick Building; New York office, 100 Broadway. *Projected steel-casting plant at Ambridge, Pa.:* The company will erect one 15-gross-ton open-hearth steel furnace instead of one 10-gross-ton. The acid process will be used.—*See page 66.*

American Sheet and Tin Plate Company, Pittsburgh. *Changes in officers at Pittsburgh:* John A. Topping is President, *vice* W. T. Graham, resigned; W. P. Beaver is no longer Assistant to the President. *Change in district sales offices:* W. H. Eaton is located in the Rookery Building instead of the Marquette Building. *Works dismantled:* The Falcon Works, at Niles, Ohio, formerly operated by the American Sheet Steel Company, are now being dismantled.—*See pages 53 and 56.*

American Steel and Wire Company of New Jersey, Chicago. *Change in officers at Chicago:* Max Pam is no longer General Counsel for the company. *Officers at Cleveland:* J. W. Carpenter is now General Superintendent of Blast Furnaces and Steel Works in the Cleveland and Pittsburgh Districts, *vice* M. McMurray, resigned. *Change in sales office:* The St. Louis sales office is now in the Chemical Building and not at 1935 Papin st. *Changes in furnaces:* The size of each of the three Central Furnaces, at Cleveland, Ohio, will be changed to 90 x 22 and the total annual capacity increased from 395,000 tons to 495,000 tons. *Sharon*

Works, Sharon: The number of wire-nail machines at the Sharon Works will be increased from 181 to 251 and the annual capacity from 900,000 kegs of wire nails to 1,116,000 kegs. *South Works, Worcester:* These works have an annual capacity of 77,000 tons of acid and 93,000 tons of basic open-hearth steel ingots.—*See pages 40, 41, 44, and 45.*

Carnegie Steel Company (of New Jersey), Pittsburgh. *Changes in sales offices:* The Buffalo sales office is now at 203A Ellicott Square and not in the German Insurance Building; the Philadelphia sales office is now in the Pennsylvania Building and not in the Harrison Building; and the St. Louis sales office is now in the Chemical Building and not in the National Bank of Commerce Building. *Clairton Steel Company:* The blast furnaces, steel works, and rolling mills of the Clairton Steel Company are now operated by the Carnegie Steel Company. *New Castle Furnaces:* Furnace No. 2 and Furnace No. 3 had not been completed down to July 25, 1904. *Girard Mill:* Closed temporarily; no truth in the report that the mill is to be dismantled. *Greenville Mill:* Closed indefinitely; no present plans for dismantling the mill. *McCutcheon Mill:* Now rolls 16-pound steel rails from short length seconds or rail ends; 18 and 20-pound rails will probably be rolled later. *Sharon Steel Works:* These works are to roll skelp from 7¾ inches to 15¼ inches; annual capacity, 90,000 tons. *Warren Mill:* Closed indefinitely; no present plan for dismantling the mill.—*See pages 4, 8, 11, 12, 13, 15, and 71.*

Clairton Steel Company, Pittsburgh. *Changes in officers:* A. C. Dinkey is now President, *vice* W. P. Snyder; W. W. Blackburn is Vice-President and Secretary, *vice* Frank B. Smith, Vice-President, and George L. Brown, Secretary and Assistant Treasurer; W. C. McCausland is Treasurer, *vice* Julius Bieler; and James J. Campbell is Auditor. *Change in operators:* The blast furnaces, rolling mills, and steel works of this company are now operated by the Carnegie Steel Company (of New Jersey).—*See pages 70–1.*

Illinois (The) Steel Company, Chicago. *Changes in sales offices:* The Philadelphia sales office is now in the Pennsylvania Building and not in the Harrison Building; the Buffalo sales office is now at 203A Ellicott Square and not in the German Insurance Building; and the St. Louis sales office is now in the Chemical Building and not in the New Bank of Commerce Building.—*See page 26.*

Lorain (The) Steel Company, Pennsylvania Building, Philadelphia. *Change in sales office:* The St. Louis sales office is now in the Chemical Building and not in the Bank of Commerce Building. —*See page 32.*

National Tube Company (of New Jersey), Frick Building, Pittsburgh. *Change in sales office:* The St. Louis sales office is now in the Chemical Building and not in the Security Building.—*See page 34.* On page 72, in the fifth line of the note under the caption "H. C. Frick Coke Company," substitute "National Tube Company, (of New Jersey,") for "National Tube Company, (of Pennsylvania.")—*See page 72.*

Pennsylvania and Lake Erie Dock Company, Carnegie Building, Pittsburgh. *President:* A President had not been elected down to August 1, 1904.—*See page 20.*

United States (The) Steel Corporation, New York. *Change in directors whose term expires in 1907:* Thomas Morrison succeeded Charles M. Schwab on July 26, 1904.—*See page 1.*

INDEPENDENT COMPANIES.

Alabama Consolidated Coal and Iron Company, Birmingham, Alabama. *Change in officers at Birmingham:* O. H. Schultz is Auditor, *vice* G. M. Bowers, resigned; H. Hammond is Assistant to the President.—*See page 186.*

Alleghany Ore and Iron Company, Clifton Forge, Virginia. *Changes in officers at Clifton Forge:* J. L. Blizzard, formerly Comptroller, is now Treasurer, *vice* W. G. Brockway, and A. H. Cushman is Comptroller. *Iron-ore mines and limestone quarries:* The company no longer owns and operates the Goshen mine, at Goshen, Virginia. Its annual capacity of iron ore is now about 150,000 tons instead of 225,000 tons. It has also given up its limestone quarries at Craigsville, Virginia. *Change in officers at Clifton Forge of the Victoria Coal and Coke Company:* J. L. Blizzard is Treasurer, *vice* W. G. Brockway; A. H. Cushman is Auditor, *vice* J. L. Blizzard. *Change in officer at Caperton, West Virginia:* E. Camm is Business Manager, *vice* A. W. Roberts.—*See pages 178–80.*

American Brake Shoe and Foundry Company, Mahwah, New Jersey. *Sale of Corning Works:* The Corning Works, at Corning, New York, have been sold to the T. H. Symington Company, 706 St. Paul st., Baltimore, Maryland. The total annual capacity of the company is now 84,000 tons of gray iron and patented brake shoes and castings instead of 99,000 tons.—*See pages 162–63.*

American Car and Foundry Company, St. Louis, Missouri. *Additional works:* This company has purchased the Memphis Works of the Southern Car and Foundry Company, at Binghampton, Tenn., which are equipped for building freight, logging, and other cars, and for the manufacture of bolts, rivets, car and locomotive wheels, iron castings, and car forgings.—*See pages 164 and 188.*

American Steel Foundries, New York. *Changes in officers:* Daniel Eagan is no longer First Vice-President; George B. Leighton is Vice-President instead of Second Vice-President.—*See page 95.*

Central Iron and Steel Company, Harrisburg, Pa. *Open-hearth steel works:* First steel made June 9, 1904.—*See page 134.*

Empire Steel and Iron Company, Catasauqua, Pa. *Change in officers:* J. S. Stillman is Secretary, *vice* J. M. Fitzgerald; he is also Treasurer. *Change in officers of the Crane Iron Works:* J. S. Stillman is Secretary, *vice* J. M. Fitzgerald.—*See pages 110–11.*

Jones and Laughlin Steel Company, Pittsburgh. *New branch offices:* A branch office has been established at Atlanta, Georgia; also at San Francisco, California. *Tube Mill:* There is no truth in the report that the company intends to erect a tube mill near McKeesport, Pa. *Additional open-hearth steel furnaces:* Four 250-gross-ton basic Talbot furnaces are to be added to the American Iron and Steel Works; the first furnace is to be completed about January 1, 1905; the remaining three furnaces are to be ready about April 1, July 1, and October 1, 1905, respectively; the annual capacity of the furnaces will be 300,000 tons of ingots. *Soaking pits:* 20 additional soaking pits are being installed in the Bessemer and open-hearth departments of the American Iron and Steel Works.—*See pages 138–39.*

La Belle Iron Works, Steubenville, Ohio. *New officers at Steubenville:* A. J. Clarke, Chairman of the Board; Isaac M. Scott, President; E. W. Mudge, Vice-President; H. D. Westfall, Secretary; and R. C. Kirk, Treasurer. John A. Topping has resigned as President. *Selling agencies:* The company has no selling agencies at Cleveland, Ohio, or at Buffalo, N. Y.—*See page 151.*

Lackawanna Steel Company, New York. *President:* A President had not been elected or appointed down to August 1, 1904. *Blast Furnace No. 3:* This furnace was first blown in on June 9, 1904. *Open-hearth steel department:* This department will probably be in operation before September 1, 1904. *Structural mill:* This mill will probably be started in August, 1904.—*See pages 100–102.*

Maryland Steel Company; general offices, Sparrows Point, Md., and Girard Building, Philadelphia. *Change in officers at Sparrows Point:* S. S. Martin is now Superintendent, *vice* Charles Pettigrew, resigned.—*See page 121.*

National Steel and Wire Company, New Haven, Conn. *Change in main offices:* The general offices of the National Steel and Wire Company and the general and executive offices of the National Wire Corporation are now located in the Engineering Building, New York City. *Change in officers:* C. E. Graham is now Treas-

urer of the National Steel and Wire Company, *vice* E. R. Hastings.—*See pages 98–9.*

Southern Car and Foundry Company, Birmingham, Alabama. *Works sold:* The Lenoir Works, at Lenoir City, Tennessee, have been sold to the Lenoir Car Works, and the Memphis Works, at Binghampton, Tennessee, to the American Car and Foundry Company.—*See pages 187–88.*

Tennessee Coal, Iron, and Railroad Company, Birmingham, Alabama. *Change in sales offices:* The New York sales office of the company has been discontinued; F. A. Burr, General Sales Agent, is now located at Birmingham, Alabama. The Chairman, First Vice-President, and Secretary and Treasurer of the company are still at 100 Broadway, New York.—*See page 180.*

United (The) Sheet and Tin Plate Company, Marietta, Ohio. *Appointment of Trustee:* D. B. Torpy, of Marietta, Ohio, was recently appointed Trustee in bankruptcy.—*See page 149.*

United States Shipbuilding Company, New York City. *Sale of plants:* All the plants of the subsidiary companies owned by the United States Shipbuilding Company, and all the property of the United States Shipbuilding Company, are to be sold by the Receiver.—*See pages 90–4.*

Wellman-Seaver-Morgan (The) Company, Cleveland, Ohio. *New branch office:* The company has opened an office in the First National Bank Building, Chicago.—*See page 156.*

Wheeling Steel and Iron Company, Wheeling, West Virginia. *Martins Ferry Furnace (rebuilding):* Will be equipped with four Massicks & Crooke stoves instead of three.—*See page 153.*

PART II—BY STATES AND DISTRICTS.

MASSACHUSETTS.

Massachusetts Steel Casting Company, Everett. This company succeeds the United States Steel Company; it will make open-hearth and crucible steel castings, but "Jupiter steel castings" will not be made. William M. Richardson is President and Robert G. Morse is Treasurer.—*See page 192.*

Mount Hope Iron Works, Mount Hope Iron Company, Somerset. Idle and for sale. Will not be operated by present owners. Address J. M. Leonard, Treasurer and Managing Owner, Somerset. —*See page 191.*

CONNECTICUT.

Omega (The) Steel Company, 169 East st., New Haven. In the hands of Charles Hudson, Receiver; plant being sold at private sale.—*See page 196.*

NEW YORK.

Buffalo and Susquehanna Iron Company, Buffalo. Office in Erie County Bank Building. No. 1 Furnace will probably be blown in in September, 1904, and No. 2 Furnace in the spring of 1905.—*See page 196.*

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.—*See page 200.*

Hyle (The) Steel Tool Company, 100 South Salina st., Syracuse. Building works will be completed and put in operation about August 15, 1904. New officers have been elected as follows: William A. Hyle, President; James S. Gordon, Vice-President; L. A. Leonard, Treasurer; Charles M. Bedell, Secretary; Charles Clarke Warren, Assistant Secretary.—*See page 202.*

Onondaga Steel Works, Sweet's Steel Company, Syracuse. Open-hearth furnace dismantled; rolling mill still in operation but machinery will be removed to the company's new plant at Newberry, Pa., before the close of 1904.—*See page 202.*

NEW JERSEY.

Pardee (The C.) Works, Incorporated, Perth Amboy. First open-hearth steel made on May 19, 1904.—*See page 209.*

Roebling's (John A.) Sons Company, Trenton. Will erect a new wire-rod mill near Florence, New Jersey, during the coming fall; estimated annual capacity, 70,000 tons; will probably be completed in 1905.—*See page 210.*

Secaucus Furnace, Secaucus. Now owned and to be operated by the Hudson Iron Company, (successor to the Eastern Iron Company,) Bowling Green Building, New York. *Officers:* Chase Andrews, President, Harold G. Villard, Vice-President, and J. M. Clark, Secretary and Treasurer, New York; Albert Trinler, General Manager, Secaucus, New Jersey.—*See page 206.*

Tremley Point Plant, American McKenna Process Company, Milwaukee, Wisconsin. D. H. Lentz, of Joliet, Ill., has resigned as General Superintendent of the company; successor not appointed. —*See page 211 (Tremley Point Plant) and page 338 (Joliet Plant).*

Trenton (The) Iron Company, Trenton. J. O. Green is now President, *vice* Edward Cooper, resigned. The company stated on August 5, 1904, that it had not sold its works.—*See page 211.*

PENNSYLVANIA.

American Duplex Steel Company, Bradford, McKean county. This company makes malleable iron and "Duplex" steel castings; it

has one special semi-open-hearth and one patented converting annealing furnace. Fuel, natural gas. Charles Creighton, President; John W. Weed, Treasurer; A. J. Paris, Jr., Secretary.—*Not described in the Directory.*

American Production Company, Reynoldsville, Jefferson county. Building works at Reynoldsville, to be equipped for the manufacture of crucible and basic open-hearth steel castings; also gray iron and brass castings; also machinery, boilers, structural ornamental iron work, etc. Charles McSherry, President and General Manager; George M. McDonald, Secretary; C. F. Hoffman, Treasurer.—*Not described in the Directory.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. Sales agent for New England, F. M. Trafton, 176 Federal st., Boston, Mass.—*See page 221.*

Damascus Steel Company; general office, Des Moines, Iowa. Works and business office, New Brighton, Pa. Plant now leased by the Damascus Crucible Steel Casting Company, which will make crucible steel castings only. The 3 hammers now in the works are to be sold. Charles Capper, President and General Manager; Charles H. Capper, Secretary and Treasurer.—*See page 260.*

Delaware River Steel Casting Company, Chester. First open-hearth steel made on June 27, 1904.—*See page 228.*

Hussey-Binns Shovel Company, Home Trust Company Building, Pittsburgh. Works at Charleroi. Equipped with 25 heating furnaces instead of 22, and with 3 instead of 2 steam hammers.—*See page 268.*

Inter-State Steel Company, Brackenridge. Name of railroad station has been changed from Avenue to Brackenridge. Hot mill completed and first hot-rolled products made in June, 1904.—*See page 251.*

Keystone Nail Works, Ellis and Lessig Steel and Iron Company, Limited, Pottstown. Limited partnership expires on October 29, 1904. Works sold on August 3, 1904, to George B. Lessig for Lessig Brothers, which is composed of George B. Lessig, J. B. Lessig, Sr., J. B. Lessig, Jr., and Louis E. Lessig. A new company will be organized and a charter applied for in August, 1904. The new company will probably be known as the Lessig Brothers Iron and Steel Company.—*See page 225.*

Liggett Spring and Axle Company, Pittsburgh. Main office is now in the Park Building, Pittsburgh.—*See page 251.*

Meyersdale Sheet Steel Company, Meyersdale, Somerset county. Commenced building in July, 1904; to be equipped with one double annealing, 2 heating, and 2 sheet furnaces and three sheet mills (two 26-inch hot and one 20-inch cold); sheet mills

formerly operated at Huntington, West Virginia, by the Huntington Tin and Planished Plate Company; product, to be light steel sheets and range plates; estimated annual capacity, 8,000 tons. Fuel to be used, bituminous coal. Will probably be completed in January, 1905. C. W. Truxal, President; A. F. Baumgarten, Vice-President and Selling Agent; E. M. Beachly, Secretary; E. R. Floto, Treasurer; T. J. Costello, General Manager.—*Not described in the Directory.*

Saxton Furnace Company, Philadelphia. Address of William H. Staake, Trustee in Bankruptcy, changed from Franklin Building, Philadelphia, to Bullitt Building, Philadelphia.—*See page 228 (Coatesville Department) and page 241 (Saxton Furnaces).*

Shenango Furnaces, Shenango Furnace Company, Frick Building, Pittsburgh. Company may erect a new furnace at Sharpsville, to be 76 x 17, and to take the place of its present No. 2 furnace, built in 1872; work on the new furnace will probably be commenced in October, 1904; estimated annual capacity, 125,000 tons. Four stoves, each 85 x 20, are being added to the company's No. 3 furnace, increasing its annual capacity to 125,000 tons.—*See page 259.*

Standard Iron Mining and Furnace Company, Drexel Building, Philadelphia. Name of furnaces changed from "Standard" to "Chickies." Property sold in June to clear title; now owned by the Standard Iron Mining and Furnace Company.—*See page 236.*

Sweet's Steel Company, Williamsport. First open-hearth steel made at its new works at Newberry, near Williamsport, on July 27, 1904; rolling mill will probably be ready for operation in September, 1904. F. M. Sears is now Secretary; C. H. Knapp is Treasurer, instead of Secretary and Treasurer.—*See page 234.*

Tidewater Steel Company, Chester. Frank Dreizler is now Secretary and Treasurer, *pro tem., vice* W. B. Johnston. C. F. Berkenbush is no longer General Superintendent.—*See page 230.*

Waynesburg Forge, Sheet, and Tin Mills, Waynesburg. Adding 6 double tuyere knobbling fires for the manufacture of charcoal knobbled blooms for consumption in their rolling mill; estimated annual capacity, 3,000 tons; may be ready for operation in August, 1904. A department for galvanizing charcoal iron sheets and steel sheets is also being added.—*See page 272.*

DELAWARE.

Brylgon Steel Casting Company, New Castle. Works not completed on August 1, 1904. Andrew Bryson is President but not Treasurer; Norman L. McElligott is no longer Secretary; John T. Dickson is Secretary and Treasurer.—*See page 274.*

MARYLAND.

North East Works, McCullough Iron Company, Wilmington, Delaware. Rolling mill and pig and scrap iron bloomary at North East, Maryland, dismantled in May, 1904.—*See page 365.*

VIRGINIA.

Liberty Furnace, Monarch Blast Furnace Company, Liberty Furnace P. O. E. P. Lee succeeds John P. Marshall as Superintendent. —*See page 282.*

WEST VIRGINIA.

Jackson Iron and Tin Plate Works, Clarksburg. Security Trust Company, Trustee, Wheeling. Works not sold on July 9, 1904; date of sale indefinite.—*See pages 286 and 437.*

KENTUCKY.

Ashland Furnaces, Ashland Iron and Mining Company, Ashland. Rebuilding No. 1 furnace; when completed will be 75 x 17 and will be equipped with an additional Massicks & Crooke stove, 75 x 18; the old No. 1 stack has been dismantled.—*See page 288.*

Louisville Bolt and Iron Company, Incorporated, Louisville. To be reorganized; if plan fails the plant will be sold.—*See page 290.*

TENNESSEE.

Southern (The) Steel Works, Chattanooga. Adding one 2-gross-ton Tropenas converter to make steel castings.—*See page 296.*

ALABAMA.

Alabama Steel and Wire Company, Birmingham. Gadsden Works; first open-hearth steel made on June 24, 1904.—*See page 303.*

Central Iron and Coal Company, 116 Nassau st., New York. Furnace at Holt, near Tuscaloosa, Alabama. The post-office address of R. E. Lee, Superintendent, is now Holt, Tuscaloosa county, and not Tuscaloosa.—*See page 298.*

Lookout Mountain Iron Company, Battelle. Did not blow in its new furnace in July; now expects to have it in blast in August, 1904. G. B. McCormack is Vice-President as well as Erskine Ramsay.—*See page 299.*

Sheffield Furnaces, Sheffield Coal and Iron Company, 907 Maritime Building, New York. Furnaces at Sheffield, Alabama. William Edenborn has resigned as President but is still Treasurer; Leonard Peckitt is President.—*See page 300.*

Vanderbilt Furnace, Tutwiler Coal, Coke, and Iron Company, Birmingham. The general offices of the company are in the Woodward Building. Morris Adler is Vice-President and L. A. Butterfield is Secretary.—*See page 301.*

Woodward Iron Company, Woodward. Contemplates erecting 300 bee-hive coke ovens at Woodward.—*See page 301.*

OHIO.

Cherry Valley Furnace, The Cherry Valley Iron Company, Pittsburgh. Furnace at Leetonia, Ohio. Erection of a new furnace commenced in June, 1904; will probably be completed in October, 1904; old stack dismantled in June, 1904.—*See page 307.*

Cuyahoga Falls Plant, Cuyahoga Wire and Fence Company, Cuyahoga Falls. Sold to the Acme Wire Company.—*See page 323.*

Dover Forge, The Dover Forge and Iron Company, Canal Dover. Rolling mill and forge not completed and put in operation in July, 1904. Company now expects to have the entire plant in operation by September 15, 1904.—*See pages 324 and 327.*

Portsmouth Steel Company, Wheeling, West Virginia. Works at Portsmouth, Ohio. The general offices of the company are in the City Bank Building, Wheeling. The company contemplates adding one 3-high plate mill at Portsmouth.—*See page 319.*

Youngstown Works, The Youngstown Iron Sheet and Tube Company, Youngstown. J. A. Campbell is President and General Manager; H. G. Dalton succeeds J. A. Campbell as Vice-President. The gray iron foundry of the company has an annual capacity of 1,000 tons instead of 500 tons.—*See page 311.*

INDIANA.

Matthews Steel Casting Company, Matthews. Plant purchased and to be operated by the Electric Steel Casting Company. *Officers:* Willis K. Gore, President, and Philip Angsten, Treasurer, Chicago, Ill.; P. A. Hughes, Vice-President, Johnstown, Pa.; Guy S. Rinebolt, Secretary and General Manager, Matthews, Ind.—*See page 333.*

MICHIGAN.

Seamless (The) Steel Tubes Company, Detroit. May remove works from 833 River street to the Delray district.—*See page 345.*

WISCONSIN.

Smith (George H.) Steel Casting Company, Milwaukee. Works destroyed by fire on April 29, 1904; being rebuilt.—*See page 348.*

OREGON.

Rolling Mill Department, Pacific Hardware and Steel Company, San Francisco, California. Branch office, Gerken Building, New York. Works at Portland, Oregon. The 10-inch train has been changed to a 9-inch and the 16-inch train from 2-high to 3-high. George K. Burton is Manager, *vice* N. E. Ayer.—*See page 355.*

INDEX TO NAMES OF WORKS.

This index includes the names of all the blast furnaces, rolling mills, steel works, tinplate and terne plate works, and forges and bloomaries.

BLAST FURNACES.

ROLLING MILLS AND STEEL WORKS.

TINPLATE AND TERNE PLATE WORKS.

FORGES AND BLOOMARIES.

INDEX TO NAMES OF COMPANIES.

This index includes the names of all firms, companies, or individuals owning or operating blast furnaces, rolling mills, steel works, tinplate or terne plate works, forges and bloomaries, cut-nail works, wire-nail works, wrought iron and steel pipe works, car-axle works, carbuilding works, malleable iron works, iron-ore mines, coal mines, limestone quarries, railroads, lake vessels, etc., in the United States which are mentioned or described in the present edition of the Directory.

INDEX TO PIG IRON BRANDS.

This list contains the names of all the brands of pig iron so far as they were reported to us by the blast furnace operators.