





Red.

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

no all.

EMBRACING A COMPLETE LIST OF THE
BLAST FURNACES, ROLLING MILLS, STEEL WORKS, FORGES,
AND BLOOMARIES IN EVERY STATE AND TERRITORY;
ALSO, WIRE MILLS, WIRE-NAIL WORKS, CAR-AXLE
WORKS, CAR-WHEEL WORKS, CARBUILDERS,
LOCOMOTIVE WORKS, WROUGHT-IRON PIPE
WORKS, AND CAST-IRON PIPE WORKS.

COMPILED AND PUBLISHED
BY THE AMERICAN IRON AND STEEL ASSOCIATION.

TENTH EDITION.

CORRECTED TO NOVEMBER, 1889, WITH ADDENDA.

PHILADELPHIA:
PUBLISHED AT No. 261 SOUTH FOURTH STREET
1890.

2669.102
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Entered, according to act of Congress, in the year 1889,
BY THE AMERICAN IRON AND STEEL ASSOCIATION,
In the office of the Librarian of Congress, at Washington.

r TS301.A6

1890

Directory to the iron and
steel works of the United
States

Philadelphia, Pa. : The
Association,

Printed by
ALLEN, LANE & SCOTT,
Nos. 228-231-233 South 2nd Street,
Philadelphia.

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PREFACE TO THE TENTH EDITION.

THE Tenth Edition of the Directory of the American Iron and Steel Association to the Iron and Steel Works of the United States is presented to all the members of the Association at the beginning of a new year in the confident hope that it will be found to be even more complete in all its features than any of its predecessors. The detailed information which it contains is brought down to the very latest moment before the actual printing of its pages, and is virtually complete to the 1st day of January, 1890. It embraces 263 pages. No pains and no expense have been spared to gather into these pages the very latest information concerning changes which have taken place in the ownership or equipment of established iron and steel enterprises and concerning the organization of new enterprises since the appearance of the last edition just two years ago. The task of accurately noting all the changes that have taken place and all the new enterprises that have been undertaken in these two years has been particularly difficult. Never before in all our experience have there been in the same period of time so many changes and so many new enterprises. Notwithstanding the very low prices for many iron and steel products which prevailed during 1888 and the first half of 1889, these two years were the most active in our history in the extension of our facilities for the manufacture of iron and steel in all forms.

The great activity in the American iron trade during the last two years has been chiefly noticeable in the erection of blast furnaces in the Southern States and in the erection of steel works in the Northern States. There has also been observable in these two years a marked tendency to increase the capacity of individual establishments and to consolidate and expand existing blast-furnace, rolling-mill, and steel-making enterprises. The same tendency to consolidation has also been observable in the mining of iron ore, in the production of coke, and in the furnishing of natural gas—all raw materials in the manufacture of iron and steel. We are glad to be able to add, however, that in the tendency to consolidation above noticed there has been nowhere established a single trust, using the word in its present popular sense. There have been sales outright and actual consolidations of capital and plants, but there is not to-day in this country one trust in the manufacture of iron and steel, nor so far as we know in the supply of iron ore, coke, or natural gas, by the terms of

which one company or firm agrees for a stipulated price to retire from the general market and cease or restrict production.

The present edition is arranged upon the same general plan as its predecessors. It contains complete lists of the blast furnaces, rolling mills, Bessemer steel works, Clapp-Griffiths steel works, Robert-Bessemer steel works, open-hearth steel works, crucible steel works, forges, bloomaries, cut-nail works, wire-rod and wire mills, wire-nail works, car works, car-axle works, car-wheel works, locomotive works, and cast and wrought iron pipe works in the United States. These lists are accompanied by an index of the blast furnaces, rolling mills, steel works, forges, and bloomaries which are described, and by another index of the companies, firms, and individuals by whom these works are operated.

Blast Furnaces Built and Building.—In the present edition of the Directory we enumerate 575 blast furnaces as being either active in November last or as likely to be some day active, as compared with 582 furnaces which were enumerated in like manner in November, 1887, for our last Directory. The present total has been obtained by adding 41 absolutely new furnaces which have been completed within the two years indicated and subtracting 48 furnaces which have been transferred to the abandoned list for various reasons—some because they have not been in blast for several years and are badly located, and others because they have been torn down to make room for new furnaces. All the charcoal furnaces in West Virginia and several in Pennsylvania, Maryland, Virginia, Wisconsin, and other States are among the number which have been transferred to the abandoned list. The whole number of charcoal furnaces has been reduced from 168 to 146. A net decrease of 10 in the number of anthracite furnaces, which includes those which use mixed anthracite and coke, has taken place; while there has been a net increase of 25 in the number of furnaces which use bituminous coal and coke.

The number of furnaces which were actually in course of erection in November, 1887, was 30, and the number in course of erection in November, 1889, was almost as large, 27. Of the new furnaces building in November last 3 were anthracite, 17 were bituminous, and 7 were charcoal.

The greatest activity in the building of new furnaces during the two years ending in November last has been in Alabama. Two years ago there were 24 completed furnaces in Alabama and 19 furnaces were building; in November last there were 44 completed furnaces in that State and 8 were building. Tennessee has not shared conspicuously in the activity in the building of new furnaces which has

given such a boom to Alabama during the past two years. In November, 1887, Tennessee had 17 completed furnaces and 3 building; while in November, 1889, it had 19 completed furnaces and none building. The number of completed furnaces in Virginia two years ago was 33, and one furnace was building; in November, 1889, there were 32 completed furnaces and 2 building. In Maryland, which we are also accustomed to class among the Southern States, there are now 16 completed furnaces, including 2 new furnaces at Sparrow's Point built recently by the Pennsylvania Steel Company, and there are 2 building by the same company and one charcoal furnace is building at Principio. Only one furnace was under construction in Kentucky in November, 1889, while 2 were going up in Texas.

There has been less activity displayed in the building of new furnaces in the Northern States during the past two years than in the Southern States. In November last Pennsylvania was building only 5, Ohio 2, and Illinois, Michigan, Wisconsin, and Minnesota each one.

Since November 1, 1889, however, work has been commenced upon 10 new furnaces in the West and South: 4 at South Chicago, Illinois; 2 in Virginia—one at Graham and one at Roanoke; 2 at Middlesborough, Kentucky; one at Rockdale, Tennessee; and one at East Birmingham, Alabama; making 37 furnaces which are now building in the whole country.

Blast Furnace Capacity.—The annual capacity of the 582 completed furnaces in November, 1887, was 10,990,993 net tons; the capacity of the 575 completed furnaces in November, 1889, was 13,168,233 net tons; an increase of 2,177,240 net tons, or 1,943,964 gross tons, in two years. Of course, as we have often explained, it is never possible in actual production to come at all near to our aggregate capacity; but the increase in capacity in the last two years has been very great, and when considered in connection with the additional capacity of the furnaces now building it may be regarded as fully demonstrating our ability to meet any demand which the country may make upon our blast-furnace owners for pig iron of any quality, spiegeleisen and ferro-manganese excepted.

The aggregate capacity of the blast furnaces of the United States at the close of 1889 is not only much larger than it was two years ago but the average capacity is also much larger. In November, 1887, the average capacity of all the furnaces which were then active or likely to be some day active was 18,885 net tons per annum, or 363 net tons per week; in November, 1889, the average capacity of furnaces in the same list was 22,901 net tons per annum, or 440 net tons per week. These figures indicate great progress in the last two years.

Blast Furnace Summary.—We present on page xiv a tabulated statement of the number and capacity of the furnaces completed in each pig-iron manufacturing State on the 1st of November, 1889, and not transferred to the abandoned list, and of the number of furnaces then in course of erection in each State, specifying the fuel used or to be used. Comparing the more important footings of the table above referred to with the corresponding aggregates presented in our Directory of two years ago and adding some other details we have the following results.

Furnaces.	November, 1887.	November, 1889.
Whole number of completed furnaces not abandoned	582	575
Anthracite and mixed anthracite and coke furnaces	200	190
Bituminous coal and coke furnaces.....	214	239
Charcoal furnaces.....	168	146
Number of furnaces building.....	30	27
Annual capacity of completed furnaces, in net tons..	10,990,993	13,168,233
Annual capacity of furnaces building, in net tons....	1,122,000	1,124,000

Rolling Mills and Steel Works.—In the last Directory there were enumerated 433 completed rolling mills and steel works in the United States in November, 1887, with 12 building. In the present edition we enumerate 445 in November, 1889, with 11 building. During the intervening two years 39 new rolling mills and steel works have been built and 27 have been abandoned, leaving a net increase of 12. Of the 39 new enterprises completed in the last two years many of them embraced works for the manufacture of steel by either the Bessemer or the open-hearth process.

Rolling Mill Capacity.—The whole number of puddling furnaces has increased from 4,882 in November, 1887, to 4,914 in November, 1889. The heating furnaces numbered 2,686 in 1887 and 2,733 in 1889. The number of trains of rolls has increased from 1,486 in 1887 to 1,510 in 1889. The annual capacity of the rolling mills in finished iron and steel has shown a large increase since the publication of our last Directory. In November, 1887, their annual capacity was estimated at 8,265,000 net tons, and in November, 1889, at 9,215,000 tons.

In November, 1887, there were 81 rolling mills, which contained 6,350 nail machines, devoted to the manufacture of cut nails and spikes. In November, 1889, the number of rolling mills manufacturing cut nails and spikes was 75, with 6,066 nail machines.

Standard Bessemer Steel Works.—In November, 1887, there were in this country 35 standard Bessemer steel works, (not including Clapp-Griffiths plants,) with 74 converters, and 3 new standard plants were in course of erection, with 5 converters. In November, 1889, there

were 41 standard Bessemer steel works completed, with 88 converters, and no new plants in course of erection. The increase which has taken place during the past few years in the erection of standard Bessemer steel plants has been chiefly in the addition to existing iron rolling mill plants of small converters for the production of steel for nail plate and wire billets, and for structural, machinery, and many miscellaneous purposes. The extensive Bessemer steel plant of the Allegheny Bessemer Steel Company, at Duquesne, near Pittsburgh, is a prominent exception to the general tendency. Its product is rails exclusively. It made its first blow in February, 1889, and its first rail in March. The annual ingot capacity of the completed and building standard Bessemer steel works in November, 1887, was 4,750,000 net tons, and in November, 1889, it was 5,600,000 tons, Clapp-Griffiths and Robert-Bessemer plants both being excluded.

Clapp-Griffiths Steel Works.—The Clapp-Griffiths steel industry in this country has made no progress in the last two years; indeed it has slightly retrograded. In November, 1887, there were described 8 Clapp-Griffiths plants, with 15 converters, and one plant, which had been removed from Port Henry, New York, was then in course of erection at Pittsburgh. In November, 1889, there were still only 8 completed plants, containing in all 14 converters. The plant which was building at Pittsburgh in 1888 was removed in that year to Durango, Mexico. The annual ingot capacity of the completed and building Clapp-Griffiths plants in November, 1887, was estimated at 225,000 net tons, which capacity had decreased to 200,000 tons in November, 1889.

Robert-Bessemer Steel Works.—Within the past two years there has been introduced into this country from France a modification of the Bessemer process known as the Robert-Bessemer process. In November, 1889, 7 completed Robert-Bessemer plants had been built in this country and one plant was in course of erection. The completed plants contain 11 converters, and there were 3 converters in course of erection. All the converters operated by this new method are of small capacity. They will be used in making castings and for miscellaneous purposes.

Open-Hearth Steel Works.—The open-hearth steel industry continues to show the same progress that has been noted in previous editions of the Directory. In November, 1887, there were 50 completed open-hearth steel plants in the United States and 3 plants were building. In November, 1889, there were 56 completed plants and 5 plants were building. In November, 1887, there were 94 completed open-hearth furnaces and 10 furnaces were building. In November, 1889, the number of completed open-hearth furnaces had increased to 116, and 23 furnaces were building. In addition to the entirely new plants which

have been completed since November, 1887, a number of furnaces which had previously been built have been remodeled and enlarged. The furnaces which were building in November, 1889, are nearly all of large size and capacity. Two of these furnaces, one in Virginia and one in Alabama, are expected to use the basic process when they are completed. Two more basic open-hearth furnaces are projected at Chattanooga, Tennessee, by the Southern Iron Company. The annual capacity of the open-hearth furnaces completed in November, 1889, is estimated at 1,000,000 net tons of ingots, and of the 23 furnaces then in course of erection at 200,000 net tons, making a total of 1,200,000 tons, against 815,000 tons in November, 1887.

Crucible Steel Works.—Our crucible steel industry has been practically stationary for a number of years, owing to the competition of steel made by other methods. In November, 1887, there were 41 works producing steel by the crucible process, containing 3,398 pots, and one crucible steel plant was building, to contain 20 pots. In November, 1889, there were 43 completed crucible steel works, containing 3,378 pots, and 3 plants were building, to contain 150 pots.

Basic Steel Plants.—Except experimentally basic Bessemer steel has not yet been made in this country. Very soft basic open-hearth steel is now being made at two steel works in Pennsylvania—the Pennsylvania works at Steelton and the Homestead works near Pittsburgh.

Forges and Bloomaries.—In November, 1887, there were 38 forges prepared to make wrought iron direct from ore, which number had decreased to 23 in November, 1889, New York losing 6, Tennessee 5, and Maine, Pennsylvania, North Carolina, and Missouri each losing one. Tennessee, which only a few years ago had 23 forges making iron direct from ore, has but 3 forges left. In the mountainous districts of East Tennessee the forges were usually operated by farmers, who only made bar iron from ore whenever it was needed in their immediate neighborhood. Each forge usually had two fires, with a daily production of about 250 pounds to the fire. Concerning this industry in Tennessee Dr. R. C. Rhea says in a recent communication to us: "In one or two more years not a forge hammer will be heard in our valleys. All will be numbered with the things of the past." In 1887 there were 37 bloomaries prepared to make blooms from scrap iron and pig iron, and in 1889 there were only 27. This, too, is a declining industry.

In 1887 the annual capacity of the iron-ore forges was 63,000 net tons, and in 1889 it was 45,000 tons. In 1887 the annual capacity of the bloomaries was 54,000 net tons, and in 1889 it was 44,000 tons. Many of the surviving forges and bloomaries are now idle.

Miscellaneous Works.—The number of miscellaneous works enumerated in this Directory, in addition to blast furnaces, rolling mills, steel works, forges, and bloomaries, and not including works owned by railroad companies, is as follows: wire-nail works, 37; wire-rod and wire mills, 55; carbuilding works, 99; car-wheel works, 113; car-axle works, 70; wrought-iron pipe works, 28; cast-iron pipe works, 35; locomotive works, 25.

Territorial Distribution of Our Iron and Steel Industries.—Pig iron is now made in 24 States; rolling mills are found in 28 States and one Territory; cut nails are made in 15 States; wire nails in 13 States; Bessemer steel is made in 11 States; Clapp-Griffiths steel in 3 States; Robert-Bessemer steel in 5 States; open-hearth steel in 11 States; crucible steel in 11 States; there are iron-ore forges in 5 States, and there are pig-and-scrap bloomaries in 5 States.

Natural Gas.—The number of rolling mills and steel works enumerated in the present edition of the Directory which use natural gas wholly or in part as fuel is 104, against 96 in November, 1887, 68 in August, 1886, and 6 in September, 1884. Although the number of establishments which use natural gas has increased since the appearance of our last Directory, it will be observed that the increase has been very slight. It may also be added that during the past year there has been much interruption to the use of natural gas at many iron and steel establishments, caused by an inadequate supply, and that some manufacturers are now contemplating a return to the use of coal entirely. Whether the cause of the inadequate supply of natural gas at some iron and steel works is due to a diminished supply from nature's storehouse or to a diversion of the popular fuel from manufacturing to domestic purposes is not clear from the published explanations which have been made, but the conclusion appears to be entirely justified that the maximum consumption of natural gas in the manufacture of iron and steel has been reached and passed.

Of the total number of iron and steel establishments which are now using natural gas 60 are located at Pittsburgh and in Allegheny county, Pa., 17 are in the western district of Pennsylvania outside of Allegheny county, 6 are at Wheeling and its vicinity in West Virginia, 18 are in Ohio, and 3 are in Indiana. Five rolling mills and steel works now building or remodeling will use natural gas when finished—2 in Pennsylvania, 2 in Ohio, and one in Indiana. Of the two rolling mills being built in Ohio to use natural gas, one is at Cambridge, Guernsey county, in the eastern part of the State, and one is at Lancaster, Fairfield county, in the central part. The natural-gas district of Indiana is located in the eastern and central parts of the

State. Since the last edition of our Directory appeared three rolling mills have been removed from various parts of Indiana to this district to obtain a supply of natural gas. One of these mills was removed from Greencastle to Muncie, Delaware county, and one from Aurora to Greenfield, Hancock county, while another, which has been removed from Aurora to Anderson, Madison county, is now in course of erection. A rod mill was also built at Anderson in 1889.

New Fuels.—During the past few years, and particularly during the past two years, much attention has been given by our iron and steel manufacturers to the substitution of various new gaseous and other fuels for coal in heating furnaces and for generating steam—coal, petroleum, and water being the elements employed, either singly or in combination. The use of petroleum especially has greatly increased at iron and steel works during the past two years, and various systems for its use have been introduced. This edition of the Directory describes 21 rolling mills and steel works which were using petroleum in November last, either wholly or in part, as fuel, and there may be a few others which are now using petroleum. It is probable, however, that most of the gaseous fuel of the future which will be used in our iron and steel works and which is not obtained from nature's storehouse of natural gas will be produced from coal, as is now the case in regenerative and other furnaces, and to this use the vast accumulations of waste or slack coal, of low market value, will greatly contribute. In this connection it may be mentioned that the use of coal in a pulverized state, by direct combustion, has also been successfully experimented with in late years at some of our iron and steel works.

Consolidations.—The most important consolidation of iron and steel enterprises in this country which has taken place at any time in our history occurred on May 4th, 1889, when the North Chicago Rolling Mill Company, the Union Steel Company, and the Joliet Steel Company, all important Illinois enterprises, were consolidated under the name of the Illinois Steel Company. Late in 1889 the Southern Iron Company was formed by the consolidation of the Warner Iron Company, (including the Goodrich plant,) the Aetna Iron Company, the La Grange Furnace Company, the Wayne Iron Company's lands, the Drouillard Iron Company, and the Nashville Furnace Company, all in Tennessee; the Attalla Furnace Company, in Alabama; and the steel plant and rail mill of the Roane Iron Company, at Chattanooga, Tennessee. A few years ago many Southern iron enterprises were consolidated by the Tennessee Coal, Iron, and Railroad Company.

J. M. S.

GRAND SUMMARY.

IRON AND STEEL WORKS.	November, 1889.	November, 1887.
Number of completed Blast Furnaces—239 Bituminous, 190 Anthracite and Coke, and 146 Charcoal: total,	575	582
Number of Blast Furnaces building in November, 1889—17 Bituminous, 3 Anthracite, and 7 Charcoal: total,	27	30
Annual capacity of completed Blast Furnaces, net tons,	13,168,233	10,990,993
Annual capacity of the Bituminous Furnaces, net tons,	8,223,500	6,442,700
Annual capacity of the Anthracite Furnaces, net tons,	3,723,333	3,391,493
Annual capacity of the Charcoal Furnaces, net tons,	1,221,400	1,156,800
Number of completed Rolling Mills and Steel Works,	445	433
Number of Rolling Mills and Steel Works building,	11	12
Number of Single Puddling Furnaces, (a double furnace counting as two single ones,)	4,914	4,882
Number of Heating Furnaces,	2,733	2,686
Number of Trains of Rolls,	1,510	1,486
Annual capacity of completed Rolling Mills, net tons,	9,215,000	8,265,000
Number of Rolling Mills having Nail Factories,	75	81
Number of Nail Machines,	6,066	6,350
Number of Nail Factories building,	1	1
Number of Nail Machines to be used in the new Factories,	100	60
Number of completed standard Bessemer Steel Works,	41	35
Number of Bessemer Steel Works building,	3	3
Number of Bessemer Converters in November, 1889,	88	74
Annual capacity (built and building) in ingots, net tons,	5,600,000	4,750,000
Number of completed Clapp-Griffiths Steel Works,	8	8
Number of Clapp-Griffiths Steel Works building,	1	1
Number of Clapp-Griffiths Converters in November, 1889,	14	15
Annual capacity (built and building) in ingots, net tons,	200,000	225,000
Number of completed Robert-Bessemer Steel Works,	7	7
Number of Robert-Bessemer Steel Works building,	1	1
Number of Robert-Bessemer Converters in November, 1889—11 completed and 3 building	11	11
Annual capacity (built and building) in ingots, net tons,	125,000	125,000
Number of completed Open-Hearth Steel Works,	56	50
Number of Open-Hearth Steel Works building,	5	3
Number of Open-Hearth Furnaces in November, 1889—116 completed, 23 building, and 2 standing nearly completed,	116	94
Annual capacity (built and building) in ingots, net tons,	1,200,000	815,000
Number of completed Crucible Steel Works,	43	41
Number of Crucible Steel Works building,	3	1
Number of Steel-melting Pots in completed works,	3,378	3,398
Annual capacity in ingots, net tons,	111,500	112,000
Number of Forges making wrought iron from ore,	23	38
Annual capacity in blooms and billets, net tons,	45,000	63,000
Number of pig and scrap iron Bloomeries,	27	37
Annual capacity in blooms, net tons,	44,000	54,000

SUMMARY BY STATES.

BLAST FURNACES.

STATES.	Furnaces Completed November, 1889.				Furnaces Building November, 1889.				Annual Capacity of Completed Furnaces November, 1889, in net tons.			
	Anthracite.	Bituminous.	Charcoal.	Total.	Anthracite.	Bituminous.	Charcoal.	Total.	Anthracite.	Bituminous.	Charcoal.	Total. Net tons.
Maine,			1	1							6,000	6,000
Massachusetts,			4	4							14,500	14,500
Connecticut,			8	8							27,000	27,000
New York,	25	4	10	39					439,400	185,000	75,000	699,400
New Jersey,	18			18					303,845			303,845
Pennsylvania,	141	73	16	230	1	4		5	2,765,088	2,906,000	62,500	5,733,588
Maryland,	5	2	9	16	2		1	3	200,000	17,000	52,600	269,600
Virginia,		13	19	32		2		2		367,000	47,500	414,500
West Virginia,		6		6						180,000		180,000
Kentucky,		4	3	7		1		1		77,000	12,000	89,000
Tennessee,		10	9	19						300,000	99,000	399,000
North Carolina,			2	2							7,200	7,200
Georgia,		2	3	5						55,000	25,000	80,000
Alabama,		32	12	44		6	2	8	1,133,000	144,000		1,277,000
Texas,			1	1			2	2			8,000	8,000
Ohio,	64	12	76		1	1	2		1,782,500	46,100		1,828,600
Indiana,		2		2						30,000		30,000
Illinois,		16		16		1		1		848,000		848,000
Michigan,	1		26	27			1	1	15,000		426,500	441,500
Wisconsin,		4	6	10		1		1		113,000	99,500	212,500
Minnesota,						1		1				
Missouri,		5	3	8						170,000	44,000	214,000
Colorado,		2		2						60,000		60,000
Oregon,			1	1							15,000	15,000
Washington,			1	1							10,000	10,000
Total,	190	239	146	575	3	17	7	27	3,723,333	8,223,500	1,221,400	13,168,233

From November, 1887, to November, 1889, we have transferred to the abandoned list 48 furnaces, 16 in Pennsylvania, 6 in Ohio, 5 in Wisconsin, 4 in each of the States of Maryland and Missouri, 3 in each of the States of Virginia and West Virginia, 2 in New York, and one in each of the States of Connecticut, Tennessee, Texas, Minnesota, and California. During the same period 41 new furnaces have been built, 20 in Alabama, 6 in Ohio, 4 in Pennsylvania, 3 in Tennessee, 2 in each of the States of Maryland and Virginia, and one in each of the States of New York, Georgia, Michigan, and Wisconsin.

SUMMARY BY STATES.

ROLLING MILLS, STEEL WORKS, FORGES, AND BLOOMARIES.

STATES AND TERRITORIES.	Rolling Mills and Steel Works.	Iron and Steel Rolling Mills.*	Cut- Nail Ma- chines.	Steel Works.					Forges and Bloom- aries.
				Bessemer.	Clapp-Griffiths.	Robert-Bessemer.	Open-hearth.	Crucible.	
Maine, . . .	1	1	.						.
New Hampshire, . .	1	1	.				1		.
Vermont, . . .	.	.	.				.		1
Massachusetts, . .	16	15	326	2	1	.	2	1	.
Rhode Island, . .	1	1	.				.	.	.
Connecticut, . .	8	8	.				.	3	.
New York, . . .	23	20	.	1	.	.	2	5	16
New Jersey, . .	21	20	213	.	.	.	1	7	8
Pennsylvania, . .	202	187	1,845	17	6	3	31	20	15
Delaware, . . .	10	10	.	.	.	.	.	.	.
Maryland, . . .	6	6	.	.	.	.	.	1	2
Virginia, . . .	6	6	146	1	.	.	.	.	2
West Virginia, . .	7	7	822	2	.	.	.	.	.
Kentucky, . . .	7	7	126	.	.	.	1	.	.
Tennessee, . . .	5	4	115	2	.	.	1	1	3
North Carolina, . .	.	.	.	.	.	.	.	.	2
Georgia, . . .	1	1	.	.	.	.	.	.	.
Alabama, . . .	7	7	72	.	.	.	.	.	1
Texas, . . .	1	1	.	.	.	.	.	.	.
Ohio, . . .	62	59	1,309	6	.	1	11	1	.
Indiana, . . .	15	13	345	1	.	1	2	2	.
Illinois, . . .	22	21	474	7	1	1	3	1	.
Michigan, . . .	4	3	.	.	.	1	.	1	.
Wisconsin, . . .	1	1	100	.	.	.	.	.	.
Minnesota, . . .	2	2	.	.	.	.	.	.	.
Missouri, . . .	7	7	50	1	.	.	.	.	.
Iowa, . . .	1	1	.	.	.	.	.	.	.
Kansas, . . .	1	1	.	.	.	.	.	.	.
Colorado, . . .	2	2	27	1	.	.	.	.	.
Wyoming Ter., . .	1	1	.	.	.	.	.	.	.
California, . . .	4	4	96	.	.	.	1	.	.
Total, . . .	445	417	6,066	41	8	7	56	43	50

Number of rolling mills building, 9. Number of steel plants building, 9 (1 Robert-Bessemer, 5 open-hearth, and 3 crucible.)

* Excludes all steel works that contain no trains of rolls.

THE IRON AND STEEL WORKS

OF

THE UNITED STATES.

BLAST FURNACES.

NOTE.—A list of furnaces which have been abandoned or which are likely to remain inactive for some time will be found separately printed after the following list of furnaces which are either active or can be readily put in blast. The telegraph address is given only when it is not the same as the post-office address. When the power is not mentioned steam-power is understood.

MAINE.

CHARCOAL.

Katahdin Furnace, Katahdin Charcoal Iron Company, Bangor. Furnace at Katahdin Iron Works P. O., Piscataquis county. One stack, 50 x 11, built in 1846, rebuilt in 1874, burned in 1883, and rebuilt in 1885; hot blast; water-power; fuel, charcoal; ore, local limonite, yielding from 50 to 55 per cent., roasted in a Davis & Colby calcining kiln; specialty, car-wheel pig iron; annual capacity, 6,000 net tons. Brand, "Katahdin." C. A. Gibson, President; H. McLaughlin, Treasurer.

Number of furnaces in Maine: one charcoal stack.

MASSACHUSETTS.

CHARCOAL.

Lanesborough Furnace, E. T. Slocum, Trustee for mortgagees, Pittsfield, Mass. Furnace at Lanesborough, Berkshire county. One stack, 33 x 9½, built in 1847, burned June 25, 1882, and rebuilt in 1882-3; hot blast; ore, local brown hematite; specialty, car-wheel pig iron; annual capacity, 4,500 net tons.

Richmond Iron Works, Richmond Furnace P. O., Berkshire county. Three stacks, all in Berkshire county. Richmond Furnace, at Richmond, 32 x 9, built in 1829, and rebuilt in 1863; steam-power. Van Deusenville Furnace, at Van Deusenville, 32 x 9, built in 1834, and rebuilt in 1858; water-power. Cheshire Furnace, at Cheshire, 32 x 9, built in 1850, and rebuilt in 1870; steam-power. All use warm blast;

iron stoves; ore, local brown hematite, from mines owned by the works; total annual capacity, 10,000 net tons of foundry pig iron for cannon, car-wheels, and machinery. Brand, "Richmond." Main office at Richmond Furnace P. O. George Church, President and Treasurer, Great Barrington, Mass.; Porter S. Burrall, General Manager, Lime Rock, Conn.; R. A. Burget, Manufacturing Agent, Cheshire, Mass.

Number of furnaces in Massachusetts: 4 charcoal stacks.

CONNECTICUT.

CHARCOAL.

Canaan Furnaces, Barnum Richardson Company, Lime Rock, Litchfield county. Main office at Lime Rock. Furnaces at East Canaan, Litchfield county. Three stacks: No. 1, 40 x 9, built in 1840, and rebuilt in 1880; No. 2, 32 x 9, built in 1847; No. 3, 34½ x 9, built in 1872; No. 1 has closed top, Nos. 2 and 3 open tops; hot blast; steam and water power; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable purposes, known as "Salisbury" iron; total annual capacity, 15,000 net tons. Milo B. Richardson, President; Charles W. Barnum, Vice-President; Sidney P. Ensign, Secretary; Porter S. Burrall, Treasurer.

Cornwall Bridge Iron Company, Cornwall Bridge, Litchfield county. One stack, 32 x 9, built in 1833; hot blast; water-power; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 3,500 net tons. James A. Bierce, Secretary and Treasurer.

Hunts Lyman Iron Company, Huntsville, Litchfield county. Telegraph address, Falls Village. One stack, 32 x 9, built in 1847; hot blast; water-power; open top; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 5,000 net tons. M. H. Robbins, President; Samuel W. Bradley, Secretary; Charles W. Barnum, Treasurer, Lime Rock.

Kent Furnace, Kent Iron Company, Kent Furnace P. O., Litchfield county. Telegraph address, Kent. One stack, 34 x 10, built in 1849, and rebuilt in 1884; hot blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels; annual capacity, 4,500 net tons. D. J. Warner, President, Salisbury; George R. Bull, Secretary; John Hopson, Treasurer and Manager.

Lime Rock Iron Company, Lime Rock, Litchfield county. Established in 1734; first incorporated in 1828; incorporated by the present company in 1863; present furnace, one stack, 32 x 9, built in 1864; warm blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable purposes; annual capacity, 4,000 net tons. Samuel S. Robbins, President; Milo B. Richardson, Secretary and Treasurer.

Sharon Valley Iron Company, Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; open top; hot blast; water-power; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 5,000 net tons. George B. Burrall, President, Lakeville, Conn.; Charles W. Barnum, Treasurer, and Milo B. Richardson, Secretary, Lime Rock, Conn.

Number of furnaces in Connecticut: 8 charcoal stacks.

NEW YORK.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Albany City Iron Works, Albany, Albany county. Two stacks, each 60 x 16, built in 1873-4; fuel, anthracite coal and coke; total annual capacity, 30,000 net tons. Owned by A. Van Vechten, J. Howard King, and Dudley Olcott. These works have been idle for a number of years, and are for sale.

Burden Iron Works, The Burden Iron Company, Troy, Rensselaer county. Two stacks, each 60 x 16, built in 1865 and 1867; ores, magnetic from Northern New York and hematite and carbonate from Eastern New York; fuel, anthracite coal and coke; total annual capacity, 40,000 net tons. *See Rolling Mills.*

Cedar Point Furnace, Witherbees, Sherman & Co., Port Henry, Essex county. Branch sales office, 46 Wall st., New York. One stack, 71 x 15, built in 1872-3, and first put in blast August 12, 1875; four 22-foot Whitwell stoves; fuel, anthracite coal and coke; ores, Old Bed Lake Champlain and New Bed Bessemer Lake Champlain; product, foundry, mill, and Bessemer pig iron; annual capacity, 26,000 net tons. Brand, "Cedar Point."

Charlotte Furnace, Charlotte Iron Works, 343 Powers' Block, Rochester, Monroe county. Furnace at Charlotte, 7 miles from Rochester, at the mouth of the Genesee river. One stack, 65 x 15, built in 1868, and rebuilt in 1884; fuel, anthracite coal and coke; ores, local hematite, with a mixture of Lake Champlain and Lake Superior magnetic; product, foundry pig iron, especially adapted for stove plate, and suitable for general foundry purposes; annual capacity, 20,000 net tons. Brand, "Charlotte." George B. Smith, President; A. S. Clarke, Secretary and Treasurer; William John Pollock, Superintendent.

Cold Spring Furnace, West Point Furnace Company, Cold Spring, Putnam county. One stack, 60 x 15½, built in 1863; ores, Hudson river roasted carbonate and New York magnetic; fuel, anthracite coal and coke; product, neutral forge, foundry, and Bessemer pig iron; annual capacity, 17,000 net tons. Brand, "West Point." Joseph C. Kent, President, Phillipsburg, N. J.; J. Wesley Pullman, Secretary and Treasurer, 238 South Third st., Philadelphia.

Crown Point Furnaces, Crown Point Iron Company, Crown Point, Essex county. Two stacks, situated on the bank of Lake Champlain, 60 x 17 and 70 x 18, built in 1872-3, and the second stack rebuilt in 1881; six Siemens-Cowper-Cochrane stoves, three 15 x 45 and three 16 x 60; fuel, anthracite coal and coke; product, Bessemer pig iron, produced from Crown Point (or Penfield) and Chateaugay ores; total annual capacity, 45,000 net tons. Brand, "Crown Point." LeGrand B. Cannon, President, and H. M. Olmsted, Secretary and Treasurer, 21 Cortlandt st., New York. Officers at the works: A. L. Inman, General Manager; H. L. Reed, Cashier and Assistant General Manager; W. S. Green, Superintendent of furnaces. Selling agent, F. J. Dominick, 21 Cortlandt st., New York. *See Forges.*

Dutchess Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 50 x 12, built in 1873 for charcoal and enlarged and changed to anthracite in 1877; open top, with "hat;" fuel, anthracite coal and coke; annual capacity, 8,400 net tons. Not in blast since June, 1882. Offered for sale by the executors of the Estate of James Brown. John S. Schultze, President and Treasurer, 59 Wall st., New York. *See Clove Spring (charcoal) Furnace.*

Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Two stacks, each 57 x 16, built in 1872, and first blown in October 5, 1872; fuel, anthracite coal and coke; ores, hematite from Jefferson county, N. Y., and Centre county, Pa., and magnetic from Lake Superior and Canada; product used principally at the mills of the company for bar iron, angles, and plates; total annual capacity, 36,000 net tons. *See Rolling Mills.*

Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. One stack, No. 2, 70 x 14, built in 1871, and remodeled in 1883, three fire-brick stoves having been added; fuel, anthracite coal and coke; ore, local fossil; product, pig iron for stove plates and small castings; annual capacity, 36,000 net tons. (Furnace No. 1, built in 1870, torn down in 1887, with a view of replacing it with a larger stack.) E. L. Hedstrom, President, Buffalo; E. F. Holden, Treasurer, Syracuse; C. H. Smyth, Secretary and Superintendent, at the works.

Hudson Iron Works, Hudson Iron Company, Hudson, Columbia county. Two stacks, each 49 x 15, built in 1851; ores, hematite from West Stockbridge, Mass., and magnetic from Lake Champlain; fuel, anthracite coal; product, principally best quality of foundry iron, though it is also used for best grades of bar iron; total annual capacity, 26,000 net tons. Brand, "Hudson." J. W. Hoysradt, President and General Agent; S. Seymour, Secretary and Treasurer.

Kirkland Furnace, Kirkland Iron Company, Kirkland, Oneida county. One stack, 65 x 14, built in 1873, reconstructed in 1882, and changed from water to steam power; fuel, anthracite coal and coke; ores,

local and Northern New York hematite or fossiliferous and Lake Champlain and Canadian magnetic; annual capacity, 18,000 net tons. Specialty, foundry pig iron. Brand, "Kirkland." Theodore W. Dwight, President; Thomas S. Jackson, Secretary; I. A. Williams, General Manager and Treasurer, Utica, N. Y.

Onondaga Iron Company, 500 East Water st., Syracuse. Works at Geddes, Onondaga county. Two stacks, each 65 x 15½; No. 1 built in 1869-70, blown in June 17, 1870; No. 2 built in 1872, blown in November 14, 1872; fuel, anthracite coal and coke; ores, from Ontario, Clinton, and Jefferson counties, New York; product known as "Onondaga" pig iron; total annual capacity, 36,000 net tons. Foundry and mill pig iron are produced; quality nearly neutral, cold-short tendency, well adapted for boiler plate, hoops, and bands. James J. Belden, President; A. J. Belden, Secretary and Treasurer; A. C. Belden and P. Lynch, Managers.

Peekskill Furnace, Peekskill, Westchester county. One stack, 60 x 16, built in 1853, rebuilt in 1874, and refitted in 1880-1; annual capacity, 15,000 net tons. Brand, "Peekskill." Idle for a number of years. Croft Mine, Putnam county, and Croft Mine Railroad form part of this property.

Port Henry Furnaces, Port Henry Furnace Company, Port Henry, Essex county. Two stacks, situated on the bank of Lake Champlain, each 66 x 16, built in 1853 and 1861, rebuilt in 1868, 1871, and 1887; ores, Lake Champlain; fuel, anthracite coal and coke; product, forge and foundry pig iron; total annual capacity, 40,000 net tons. Brand, "Port Henry." G. R. Sherman, President; Walter C. Witherbee, Vice-President; H. B. Willard, Treasurer.

Poughkeepsie Iron Company, Albert Tower, President and Agent, Poughkeepsie, Dutchess county. Two stacks, each 60 x 16, built in 1860; ores, ⅓ Dutchess county brown hematite, ⅓ Lake Champlain magnetic, and ⅓ Forest of Dean, Orange county; fuel, anthracite coal and coke; product, foundry and forge pig iron; total annual capacity, 30,000 net tons. H. M. Braëm, Secretary, Treasurer, and selling agent, 69 Wall st., New York. Formerly operated by the Fallkill Iron Company.

Sterling Iron and Railway Company, 45 William st., New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 13, built as a charcoal furnace in 1806, converted to anthracite in 1868; and Sterling, 42 x 14, built as a charcoal furnace in 1848, converted to anthracite in 1866; ore, magnetic, mined on the company's property near the furnaces; fuel, anthracite coal; product, foundry and mill pig iron; total annual capacity, 16,000 net tons. Iron called "Sterling." A. W. Humphreys, President.

Number of anthracite and mixed anthracite and coke furnaces in New York: 25 stacks.

COKE.

Niagara River Furnace, Tonawanda Iron and Steel Company, lessee, Tonawanda, Erie county. Furnace in Niagara county. One stack, 61 x 16, built in 1873, but only in blast for a short time; leased and put in blast by the present company in 1889; iron stoves; ores, Lake Champlain and Lake Superior; fuel, coke; product, foundry pig iron; annual capacity, 25,000 net tons. William A. Rogers, President; Archer Brown, Vice-President; J. S. Willett, Secretary and Treasurer; F. B. Baird, General Manager. General sales agents, Rogers, Brown & Co., Cincinnati.

Troy Steel and Iron Company, Troy, Rensselaer county. Three stacks, each 80 x 18, built in 1886-7; twelve Whitwell stoves; fuel, coke; ores, magnetic from Essex and Clinton counties, carbonate from Columbia county, and Lake Superior; product, Bessemer pig iron; total annual capacity, 160,000 net tons. *See Rolling Mills.*

Number of coke furnaces in New York: 4 stacks.

CHARCOAL.

Black River Iron and Chemical Company, Port Leyden, Lewis county. Office, Syracuse. Two stacks, Gracie and Fannie, 50 x 9½ and 50 x 10½, respectively, built in 1864, rebuilt in 1880, and burned and rebuilt in 1881; hot or cold blast; Black river water-power; product, pig iron for car-wheels, rolls, and malleable castings; annual capacity, 18,000 net tons. Formerly operated by the Gere Iron and Mining Company. J. J. Belden, President; M. A. Knapp, Secretary; William Boone, Treasurer.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Two stacks in Clinton county: Plattsburgh Furnace, at Plattsburgh, 55 x 9½, first blown in in April, 1878, and rebuilt in 1885; Standish Furnace, at Standish, 60 x 10½, first blown in in February, 1887; iron stoves; ore, Chateaugay magnetic; product, charcoal pig iron for car-wheels and malleable purposes; total annual capacity, 20,000 net tons. Brand, "Chateaugay." Smith M. Weed, President, M. F. Parkhurst, Cashier, and A. L. Inman, General Manager, Plattsburgh; H. M. Olmsted, Treasurer, and F. J. Dominick, general sales agent, 21 Cortlandt st., New York. *See Forges.*

Chatham Furnace, Chatham Furnace Company, Chatham, Columbia county. One stack, 32 x 9, built in 1873, put in blast in July, 1873; open top; warm blast; ores, brown hematite from Richmond Furnace, Mass., and "Harlem Valley" hematite from Columbia and Dutchess counties; product, pig iron for car-wheels, cannon, chilled rolls, and malleable castings; annual capacity, 5,000 net tons. Brand, "Chatham." Formerly called Beckley Iron Works. C. S. Whitney, President and Treasurer; H. L. McMullan, Vice-President; Langdon Mallory, Secretary.

Clove Spring Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 32 x 9, built in 1830; warm blast; open top; water and steam power; ore, Clove hematite; specialty, car-wheel chilling pig iron; annual capacity, 4,000 net tons. Brand, "Clove Spring Iron." Out of blast since February 1, 1886. Offered for sale by the executors of the Estate of James Brown. John S. Schultze, President and Treasurer, 59 Wall st., New York. See *Dutchess (anthracite) Furnace*.

Copake Iron Works, Frederick Miles, Copake Iron Works, Columbia county. One stack, 32 x 9, built in 1872; open top; iron stoves; warm blast; ore, limonite, mined near the furnace; specialty, car-wheel pig iron; annual capacity, 7,500 net tons. Brand, "Copake." W. A. Miles, Manager.

Millerton Iron Company, Irondale, Dutchess county. Telegraph address, Millerton. One stack, 55 x 9½, built in 1885, and blown in February 1, 1886, taking the place of the old stack destroyed by fire May 15, 1885; two Cooper hot-blast stoves; ore, Salisbury; annual capacity, 12,000 net tons. Specialty, car-wheel pig iron. Brand, "Salisbury." George S. Frink, Secretary and Treasurer.

Phenix Furnace, Caleb S. Maltby, Millerton, Dutchess county. One stack, 32 x 9, rebuilt in 1840; open top; warm blast; ore, Salisbury, from the old Salisbury mine at Ore Hill and neighboring mines; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron. Brand, "Phenix." Edward H. Townsend, Superintendent.

Wassaic Furnace, Estate of Noah Gridley, Wassaic, Dutchess county. One stack, 32 x 9½, built in 1826, and rebuilt in 1863; warm blast; water-power; ores, Amenia hematite, mined in the neighborhood, and hematite from the Salisbury region; product, pig iron for car-wheels, chilled rolls, and malleable castings; annual capacity, 4,000 net tons. Idle. The furnace property is now for sale to close the estate.

Number of charcoal furnaces in New York: 10 stacks. Total number of furnaces in New York: 39 stacks.

NEW JERSEY.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. Three stacks, one 75 x 18, one 75 x 17, and one 60 x 18, built in 1848; remodeled since that date; one furnace has Siemens-Cowper-Cochrane stoves and the other two have iron stoves; ore, magnetic, from the company's mines; product, all grades of pig iron, with special qualities for plates, sheets, wire, nails, and car-wheel chill; total annual capacity, 50,000 net tons. Brand, "Andover." Philadelphia office, 240 South Third st. John R. Fell, President;

- Charles Gilpin, Jr., Treasurer. Superintendent of works, Joseph C. Kent, Phillipsburg.
- Boonton Furnaces, Estate of J. Couper Lord, 68 Wall st., New York. Furnaces at Boonton, Morris county. Two stacks, 70 x 14 and 60 x 16, built in 1848 and 1868, respectively, and remodeled in 1886; steam and water power; total annual capacity, 33,000 net tons. Idle. *See Rolling Mills.*
- Chester Furnace, W. J. Taylor & Co., lessees, Chester, Morris county. One stack, 60 x 13, built in 1878 to make spiegeleisen from zinc residuum, and rebuilt in 1880 to make mill pig iron; one Weimer suspended pipe stove; fuel, anthracite coal and coke; product, extra red-short mill pig iron, made from Chester ores, roasted in the Taylor gas kiln; annual capacity, 16,500 net tons. Brand, "Jersey." Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia; John W. Quincy & Co., 98 William st., New York.
- Franklin Iron Company, Franklin Furnace P. O., Sussex county. One stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; iron-pipe stoves; fuel, anthracite coal and coke; ores, New Jersey, New York, and some foreign; product, Bessemer pig iron; annual capacity, 29,000 net tons. Will soon erect Cooper stoves. E. F. Hatfield, President, H. V. Vultee, Secretary, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. W. Pierce, Superintendent, Franklin Furnace, N. J.
- Musconetcong Furnaces, Musconetcong Iron Works, Stanhope, Sussex county. Two stacks, 70 x 16½ and 80 x 20, built in 1841 and 1843, and rebuilt in 1866 and 1869; No. 1 furnace has iron stoves, and No. 2 has one single and one double Cooper-Durham stove; fuel, anthracite coal and coke; ore, magnetic, mined in Morris and Sussex counties; total annual capacity, 56,000 net tons. Specialty, No. 2 foundry and gray forge pig iron. Brand, "M. I. W." A. Pardee, President, Hazleton, Pa.; H. H. Wilson, Secretary and Treasurer, 237 South Third st., Philadelphia; I. P. Pardee, Superintendent, Stanhope, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York.
- New Jersey Zinc and Iron Company, Newark, Essex county. Sales office, 61 Maiden Lane, New York. Two stacks: A, 31 x 8, built in 1885 to take the place of two stacks built in 1855 and 1863; and B, 30 x 8, built in 1883 to take the place of the stack built in 1871; fuel, anthracite coal; product, spiegeleisen, from zinc residuum; total annual capacity, 7,500 net tons. B. G. Clarke, President, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. P. Hardenburgh, Manager, Newark.
- Oxford Iron Works, Oxford Iron and Nail Company, Oxford, Warren county. Main office, 52 Wall st., New York. One stack, 63 x 17, built in 1871; fuel, anthracite coal; ore, magnetic, mined near the works; product, mill pig iron; annual capacity, 16,000 net tons. Product is

worked up into nails, etc., by the company, only a small quantity of foundry pig iron being made and sold. J. S. Scranton, sales agent, 83 Washington st., New York. *See Rolling Mills.*

Passaic Zinc Company, 111 Liberty st., New York. Furnace in Hudson county, New Jersey. One stack, 40 x 10, built in 1883, and first put in blast in February, 1884; fuel, anthracite coal; product, spiegeleisen, from zinc residuum; annual capacity, 6,000 net tons. William Reynolds Brown, President; Charles B. Squier, Secretary and Treasurer; A. Harris Clark, Superintendent. Selling agents, Manning & Squier, 111 Liberty st., New York.

Pequest Furnace, Cooper & Hewitt, Oxford, Warren county. One stack, 67 x 16, built in 1874, and rebuilt in 1883; fuel, $\frac{2}{3}$ anthracite coal and $\frac{1}{3}$ Connellsville coke; ores, New Jersey magnetic and foreign; product, foundry, gray forge, and Bessemer pig iron. Iron actually made in one year, 27,845 net tons. B. F. Fackenthal, Jr., General Manager, Riegelsville, Pa. New York office, 17 Burling Slip. *See Ringwood Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Port Oram Furnace, Port Oram, Morris county. Address, Tooke Straker, Manager, Boonton, N. J. One stack, 60 x 16, built in 1868, and first blown in in 1869; remodeled in 1889; improved Durham hot-blast stoves; ores, mainly North Jersey magnetic, with a mixture of hematite; fuel, anthracite coal and coke; product, neutral foundry and forge pig iron; annual capacity, 15,000 net tons. Joseph Wharton, proprietor, Philadelphia.

Ringwood Furnace, Cooper & Hewitt, Hewitt, Passaic county. One stack, 48 x 13, altered from charcoal to anthracite in 1872; not in blast for several years; one unfinished stack, 65 x 16; open tops; water-power; ore, magnetic, mined at Ringwood. New York office, 17 Burling Slip. *See Pequest Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Secaucus Iron Company, Secaucus, Hudson county. Telegraph address, Jersey City. One stack, 65 x 17, completed in 1877, and first blown in in June, 1879; fuel, anthracite coal; ores, foreign hematite and New York and New Jersey magnetic; product, Bessemer pig iron; annual capacity, 26,000 net tons. Brand, "Secaucus." A. Pardee, President, Hazleton, Pa.; I. P. Pardee, Secretary and Treasurer, Stanhope, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Warren Furnace, Warren Iron Company, Hackettstown, Warren county. One stack, 56 x 16, built in 1874-5, and put in blast in 1875; closed top; ores, $\frac{2}{3}$ magnetic and $\frac{1}{3}$ hematite; fuel, anthracite coal; product, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Warren." John P. Jones, President; J. S. Moore, Treasurer, 30 Broad st., New York; John R. Bennett, Manager, at the furnace.

Number of furnaces in New Jersey: 18 completed anthracite and mixed anthracite and coke stacks, and one unfinished stack.

PENNSYLVANIA.

LEHIGH VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Allentown Iron Works, Allentown Iron Company, Allentown, Lehigh county. Three stacks: No. 1, $53\frac{1}{2} \times 14\frac{1}{2}$, built and blown in in 1846; No. 4, $60 \times 16\frac{1}{2}$, built and blown in in 1886; and No. 5, 60×17 , built in 1872, and blown in in 1873; fuel, anthracite coal and coke; ores, New York, New Jersey, and Pennsylvania magnetic and local hematite; foundry pig iron is a specialty; total annual capacity, 68,000 net tons. Brand, "Allentown." (Three stacks, built in 1846 and 1853, have been abandoned.) George F. Baer, President, and Albert Broden, General Manager, Reading, Pa.; W. R. Taylor, Secretary, and W. A. Church, Treasurer, 227 South Fourth st., Philadelphia.
- Allentown (The) Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown. Two stacks, each 68×15 , built in 1864; open tops; fuel, anthracite coal; ores, local hematite and New Jersey magnetic; product, mill pig iron; total annual capacity, 24,000 net tons. *See Rolling Mills.*
- Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Six stacks: No. 1, $61 \times 15\frac{1}{2}$, built in 1863; No. 2, 70×16 , built in 1867; No. 4, 70×16 , built in 1874-5; No. 5, 70×19 , built in 1874-5; No. 6, 70×19 , built in 1881; No. 7, (Bingen,) 65×17 , situated at Bingen, Northampton county, built in 1870; Nos. 2 and 6 are equipped with Siemens-Cowper-Cochrane stoves; the others have iron stoves; product, Bessemer pig iron, from local and foreign hematite and magnetic ores; fuel, anthracite coal and Connellsville coke; total annual capacity, 160,000 net tons. *See Rolling Mills.*
- Carbon Iron Works, Carbon Iron and Pipe Company Limited, Mauch Chunk, Carbon county. Works at Parryville, in the same county. Three stacks, 52×13 , 52×16 , and 65×16 , built in 1855, 1864, and 1869, respectively; fuel, anthracite coal; ores, hematite from Lehigh, Northampton, and Carbon counties, magnetic from New Jersey and Lake Champlain, and foreign; total annual capacity, 30,000 net tons. Product known as "Carbon" iron. M. S. Kemmerer, Chairman, and George Ruddle, Secretary and Treasurer, Mauch Chunk; H. J. Seaman, Superintendent, Parryville. Selling agents, George W. Stetson & Co., 69 Wall st., New York.
- Coleraine Iron Works, William T. Carter & Co., 302 Walnut st., Philadelphia. Works at Reddington, Northampton county. Two stacks, each 60×17 , built in 1869 and 1872; fuel, anthracite coal; ores, $\frac{1}{2}$ hematite and $\frac{1}{2}$ magnetic, from Pennsylvania and New Jersey; product, foundry pig iron; total annual capacity, 26,000 net tons.
- Coplay Iron Company, Coplay, Lehigh county. Three stacks, one 48×14 , built in 1853, and two 55×16 , built in 1862 and 1868; open tops; ores, Lehigh county hematite and New Jersey magnetic; product,

principally foundry pig iron; total annual capacity, 30,000 net tons. E. P. Wilbur, President, Bethlehem; W. H. Ainey, Secretary, Allentown; R. M. Gummere, Treasurer, South Bethlehem; M. Fackenthal, Superintendent, Coplay.

Crane Iron Works, Crane Iron Company, 224 South Fourth st., Philadelphia. Works at Catasauqua, Lehigh county. Five stacks: two 75 x 18, one 60 x 18, one 60 x 16, and one 55 x 18. Original furnaces built in 1839, 1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881. Two have iron stoves and three have Whitwell stoves; fuel, anthracite coal; ores, New Jersey magnetic, Pennsylvania hematite, Lake Superior, and foreign; specialties, foundry, open-hearth, and Bessemer pig iron; annual capacity, 150,000 net tons. Brands, "Crane," "Castle," and "Mohican." Samuel Dickson, President; W. S. Pilling, Secretary and Treasurer. Officers at Catasauqua: William R. Thomas, Superintendent; John Williams, Cashier. *See Rolling Mills and Steel Works.*

Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks county. New York office, 17 Burling Slip. One stack, 75 x 19, built in 1874, and first blown in in February, 1876; six Cooper-Durham iron stoves; fuel, anthracite coal and Connellsville coke; ores, local hematite and magnetic, New Jersey magnetic, and foreign; specialties, gray forge and Bessemer pig iron; iron actually made in one calendar year, 37,448 net tons. Brand, "Durham." (The two old stacks, built in 1848 and 1851, have been torn down.) B. F. Fackenthal, Jr., General Superintendent. Selling agents, J. Tatnall Lea & Co., Philadelphia. *See Pequest and Ringwood Furnaces, New Jersey.*

Emaus Furnace, Donaldson Iron Company, lessee, Emaus, Lehigh county. Main office, 226 Walnut st., Philadelphia. One stack, 66 x 16, completed and first put in blast October 10, 1872; rebuilt in 1879-80; fuel, anthracite coal; ores, local hematite and New Jersey magnetic; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Emaus." John Donaldson, President, 226 Walnut st., Philadelphia; George Ormrod, Manager and Treasurer, Emaus. A foundry for the production of cast-iron gas and water pipe, built in 1883 and enlarged in 1889, is operated in connection with the furnace. Selling agents, Donaldson & Duncan, 226 Walnut st., Philadelphia.

Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Established in 1843. Five stacks: one 63 x 16, one 81 x 18, one 80 x 18, one 47 x 15, and one 72 x 18. Original furnaces were first blown in in 1844, 1845, 1850, 1852, and 1869; rebuilt in 1851, 1876, 1880, and 1882. The furnaces are at Glendon, near Easton, except Furnace No. 4, which is situated at South Easton. No. 4 is blown by water-power, and has the only open top; water-power furnishes a small proportion of the blast for all the furnaces, but the main reliance is steam-power; fuel, anthracite coal, with sometimes a little

coke; ores, hematite from Northampton county, Pa., and magnetic from Morris county, N. J.; specialty, forge pig iron; total annual capacity, 100,000 net tons. Brand, "Glendon." Principal office at 18 Post Office square, Boston, Mass. Augustus Lowell, President, and Thomas T. Bouvé, Secretary and Treasurer, Boston; John S. Fackenthal, Superintendent, Easton.

Lehigh Iron Company, Allentown, Lehigh county. Two stacks: No. 1, 65 x 16, completed July 22, 1869, rebuilt in 1886; No. 2, 60 x 17, completed October 21, 1872, rebuilt in 1888; closed tops and fronts; fuel, anthracite coal and coke; ores, Lehigh county and Lake Superior hematites and New Jersey magnetics; specialty, high-grade foundry pig iron; total annual capacity, 41,000 net tons. Brand, "Lehigh." W. H. Ainey, President and Treasurer; Robert J. Marsteller, Secretary; Frank J. Rimmel, Superintendent; H. J. Detweiler, Assistant Superintendent and Chemist.

Lehigh Zinc and Iron Company, Bethlehem, Northampton county. Main office, 47 North Front st., Philadelphia. One stack, 33 x 8½, first put in blast in February, 1882; fuel, anthracite coal and coke; iron stoves; ore, residuum from Franklinite ore, after the zinc has been extracted; product, spiegeleisen; annual capacity, 3,000 net tons. Richard Heckscher, President; S. P. Wetherill, Vice-President; J. Price Wetherill, General Manager; J. H. Troutman, Secretary; August Heckscher, Treasurer.

Macungie Furnace, Macungie Iron Company, 310 Walnut st., Philadelphia. Furnace at Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in September 14, 1874; fuel, anthracite coal; ores, ¾ native hematite and ¼ New Jersey magnetic; specialty, foundry pig iron; annual capacity, 14,000 net tons. Brand, "Macungie." J. Singmaster, President; Charles Y. Audenried, Secretary and Treasurer; William M. Weaver, Superintendent, Macungie.

Northampton Furnace, Northampton Iron Company, Freemansburg, Northampton county. One stack, 65 x 15, blown in July 17, 1873.

Thomas Iron Works, Thomas Iron Company, Hokendauqua, Lehigh county. Twelve stacks, (eleven owned and one leased,) located as follows: six at Hokendauqua, two (Lock Ridge) at Alburtis, Lehigh county, two (Saucon) at Hellertown, Northampton county, and two (Keystone and Lucy) at Glendon, Northampton county. At Hokendauqua there are two stacks 60 x 16, two 60 x 17, and two 65 x 17; two were built in 1855, two in 1863, and two in 1873. Of the Lock Ridge Furnaces at Alburtis one stack is 60 x 14 and one 60 x 16, built in 1867 and 1869, respectively. The Keystone Furnace at Glendon is 65 x 16, and was first put in blast April 17, 1876; the Lucy Furnace, also at Glendon, is 65 x 14, and was built in 1872, rebuilt in 1880. The Saucon Furnaces at Hellertown are each 60 x 16, and were respectively first blown in March 25, 1868, and May 25, 1870. The

Keystone Furnace has Whitwell stoves; all others have iron-pipe stoves. Fuel, anthracite coal; ores, Lake Superior and local hematite and New Jersey magnetic; use no foreign ores; product, foundry and forge pig iron; total annual capacity, 200,000 net tons. Brand, "Thomas." B. G. Clarke, President, 52 Wall st., New York; J. T. Knight, Secretary and Treasurer, Easton; John Thomas, General Superintendent; D. H. Thomas, Superintendent; Daniel Davis, Superintendent of Lock Ridge Furnaces; Fletcher H. Knight, Superintendent of Keystone and Lucy Furnaces; Horace Boyd, Superintendent of Saucon Furnaces. Sales made by B. G. Clarke, 52 Wall st., New York; J. T. Knight, Easton; and Lyman & Co., Philadelphia. Number of furnaces in the Lehigh region: 48 stacks.

SCHUYLKILL VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Anvil Furnace, Pottstown Iron Company, Pottstown, Montgomery county. One stack, 65 x 15, built in 1867, and blown in in December, 1867; remodeled in 1889 to 80 x 17; three fire-brick stoves, 75 x 19; fuel, anthracite coal and coke; ores, magnetic and hematite; annual capacity, 40,000 net tons. Brand, "Anvil." *See Rolling Mills.*

Chester Furnace, Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. Philadelphia office, 335 Walnut st. One stack, 70 x 16, first blown in in November, 1881; three Whitwell stoves; fuel, anthracite coal and coke; ore, foreign; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Chester." *See Rolling Mills.*

Edge Hill Furnace, Edge Hill Furnace Company, Edge Hill, Montgomery county. One stack, 65 x 16½, built in 1869-72; first blown in in January, 1872; fuel, anthracite coal and coke; ores, mostly domestic, and occasionally a portion of foreign; product, foundry and mill pig iron; annual capacity, 28,000 net tons. C. Richardson, President; C. B. Richardson, Treasurer; A. S. Richardson, Superintendent.

Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13; one built in 1842, and blown in in August, 1844; the other built in 1855, and blown in in September, 1856; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, No. 2 foundry and gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Henry Clay." Selling agent, Charles W. Matthews, 321 Walnut st., Philadelphia.

Keystone Furnaces, E. and G. Brooke Iron Company, Birdsboro, Berks county. Three stacks: one, 50 x 12, built in 1853; one, 55 x 15, built in 1871; one, 60 x 16, built in 1873; fuel, anthracite coal and coke; ores, magnetic, with a large mixture of hematite; product, foundry and forge pig iron; total annual capacity, 45,000 net tons. Brand, "Keystone." *See Rolling Mills.*

Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One

- stack, 58 x 16, built in 1852, first blown in in 1853, and rebuilt in 1871; fuel, anthracite coal; ores, local magnetic and hematite; specialty, foundry pig iron; annual capacity, 18,000 net tons. Brand, "Leesport." R. T. Leaf, President, and P. R. Stetson, Secretary and Treasurer, Reading. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.
- 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; ore, foreign; product, Bessemer pig iron; annual capacity, 18,000 net tons. Brand, "Lucinda." C. K. Lippincott, President, and J. Lansing Mines, Secretary and Treasurer, 235 South Third st., Philadelphia.
- Marion Furnace, Minersville, Schuylkill county. One stack, 55 x 15, first blown in September 5, 1873; rebuilt in 1880; fuel, anthracite coal; annual capacity, 10,000 net tons. Formerly called Minersville Furnace. Idle. Owned by the Philadelphia and Reading Coal and Iron Co. and the bondholders of the Minersville Coal and Iron Co.
- Merion and Elizabeth Furnaces, Merion Iron Company, West Conshohocken, Montgomery county. Philadelphia office, 209 Walnut Place. Two stacks: Merion Furnace, 48 x 16, built in 1847, and enlarged in 1876; Elizabeth Furnace, 50 x 16, built in 1872, put in blast October 24, 1872; both stacks remodeled in 1883; ores, New York and New Jersey magnetic and local hematite; product, foundry and forge pig iron; total annual capacity, 35,000 net tons. Brand, "Merion." Specialty, neutral gray forge pig iron for boiler plate and sheet iron.
- Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, 50 x 14, built in 1854, and first blown in in 1856; remodeled in 1863 and again in 1869; ore, foreign; specialty, low phosphorus iron for crucible and open-hearth steel purposes; annual capacity, 16,000 net tons. Brand, an arrow, in the shaft of which are three circles, each containing the letter P. The company contemplates enlarging the stack. Abraham S. Patterson, President; Joseph Storm Patterson, Secretary and Treasurer; John P. Fillebrown, Manager.
- Moselem Furnace, Sheble & Stelwagon, Moselem, Berks county. One stack, 49 x 12, built in 1823 for charcoal, and rebuilt several times; annual capacity, 8,000 net tons. Not in blast. For sale. Apply to Dr. T. H. Seyfert, 1709 Mount Vernon st., Philadelphia.
- Mt. Laurel Furnace, Clymer Iron Company, Temple, Berks county. Furnace at Mt. Laurel. One stack, 50 x 12, built in 1836, rebuilt in 1847, and altered for anthracite in 1873, but not afterwards blown in until February 1, 1880; two iron stoves; ore, principally hematite; product, foundry pig iron; annual capacity, 10,000 net tons. George E. Clymer, President; Abram Sweitzer, Superintendent. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.
- Norristown Iron Works, Isaac McHose & Sons, lessees, Norristown,

Montgomery county. One stack, 55 x 16, built in 1869, and rebuilt in 1871; closed top; four Player iron stoves; fuel, anthracite coal and coke; ore, foreign; product, standard Bessemer pig iron; annual capacity, 28,000 net tons. James Hooven, owner.

Norway Furnace, Gabel, Jones & Gabel, lessees, Pottstown. Furnace at Bechtelsville, Berks county. One stack, 58½ x 15½, built in 1875, and first blown in in 1880; open top; two Player iron stoves; fuel, anthracite coal and coke; ores, Berks county magnetic, Lancaster county hematite, and Lake Superior; product, very soft and strong foundry and very strong neutral mill pig iron; annual capacity, 19,000 net tons. Specialty, No. 1 X pig iron. Brand, "Norway." Jacob H. Gabel, Treasurer; George C. Davies, Superintendent.

Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Five stacks. East Penn Furnaces, at Lyons Station, Berks county; two stacks, each 45½ x 13¾, built in 1874-5; will probably be rebuilt as a single stack; total annual capacity, 20,000 net tons. Kutztown Furnace, at Kutztown, Berks county; one stack, 55 x 14¾, built in 1875; annual capacity, 15,000 net tons. Port Carbon Furnace, at Port Carbon, Schuylkill county; one stack, 65 x 15, first put in blast in September, 1872; rebuilt in 1879 and 1881. Ringgold Furnace, at New Ringgold, Schuylkill county; one stack, 52 x 13, first blown in February 28, 1874; annual capacity, 15,000 net tons. The foregoing furnaces are offered for sale or lease. (The Emaus Furnace, at Emaus, Lehigh county, the Norway Furnace, at Bechtelsville, Berks county, the Swede Furnace, at Swedeland, Montgomery county, are also owned by this company but are operated by other parties on lease, and are described in their proper places elsewhere.) The company is also part owner of Marion (Minersville) Furnace, at Minersville, Schuylkill county, not now leased. Austin Corbin, President; Albert Broden, Engineer, Reading, Pa. *See Rolling Mills.*

Philadelphia Furnace, Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Furnace at Beach and Vienna sts., Kensington. One stack, 58 x 14, built in 1873, and blown in December 5, 1873; product, forge and foundry pig iron; annual capacity, 10,000 net tons. *See Rolling Mills.*

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Three stacks: No. 1, 59 x 15, built in 1845, and rebuilt in 1871; No. 2, 58½ x 15, built in 1845, and rebuilt in 1871; No. 3, 59 x 15, built in 1849; fuel, anthracite coal and coke; ores, magnetic and hematite, from Berks and Chester counties, and New Jersey and foreign; specialty, gray forge pig iron; total annual capacity, 45,000 net tons. Brand, "Phoenix." Wm. St. G. Kent, Superintendent of furnaces. *See Rolling Mills.*

Pioneer Furnaces, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two completed stacks and one stack building: No. 2, 60

x 13, built in 1866; and No. 3, 65 x 14, built in 1872; Player and Cooper iron stoves; fuel, anthracite coal; ore, foreign; product, Bessemer pig iron; annual capacity, 36,000 net tons. Building a furnace, 75 x 15, to take the place of No. 1 furnace, rebuilt in 1853, and torn down in 1889; when new furnace is completed No. 2 furnace will probably be abandoned. Brand, "Pioneer." *See Rolling Mills.*

Reading Iron Company, Reading, Berks county. Branch office, 417 Walnut st., Philadelphia. Four stacks: Reading Furnaces, two stacks, each 55 x 14½, built in 1854 and 1873, respectively; remodeled in 1886; Keystone Furnaces of Reading, two stacks, 55 x 15 and 50 x 14; built in 1869 and 1872-3, respectively; height of both stacks to be increased to 66 feet; ores, principally hematite from Lehigh and Lebanon counties; product, foundry and mill pig iron; total annual capacity, 85,000 net tons. *See Rolling Mills.*

Robesonia Furnace, Robesonia Iron Company Limited, Robesonia, Berks county. One stack, 80 x 18, built in 1795, and rebuilt in 1858, 1874, and 1885; three Whitwell stoves; fuel, anthracite coal and coke; Cornwall ore is exclusively used; product, Bessemer pig iron; annual capacity, 50,000 net tons. Brand, "Robesonia." W. C. Freeman, Chairman, Cornwall; William R. White, Secretary, Philadelphia; S. H. Chauvenet, Manager, Robesonia. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia.

Sheridan Furnaces, Wm. M. Kaufman & Co., Sheridan, Lebanon county. Two stacks: No. 1, 76 x 14½, built in 1862 to use charcoal, and changed to anthracite in 1867; No. 2, 78½ x 15, built in 1874-5; product, principally foundry pig iron; total annual capacity, 55,000 net tons.

Swede Furnace, R. Heckscher & Sons, lessees, Bridgeport, Montgomery county. Furnace at Swedeland, in the same county. Main office, 238 South Third st., Philadelphia. One stack, 73 x 14, built in 1850, and rebuilt in 1881 and 1887; closed top; four Durham iron stoves; fuel, anthracite coal and Connellsville coke; ores, Lake Superior and New Jersey magnetic; product, mill pig iron; annual capacity, 38,000 net tons. Brand, "Swede." A. Watters, Superintendent. Selling agents, R. & A. Heckscher & Co., Philadelphia.

Temple Furnace, Temple Iron Company, Temple, Berks county. One stack, 55 x 14, built in 1867, and rebuilt in 1875; iron stoves; ores, from Lehigh, Berks, and Lebanon counties; specialty, foundry pig iron; annual capacity, 13,440 net tons. Brand, "Temple." William D. Smith, President; Edward T. Clymer, Treasurer and Manager, 249 North Fifth st., Reading. Selling agent, J. J. Mohr, Philadelphia.

Topton Furnace Company, Isaac Eckert, Manager, Topton, Berks county. One stack, 70 x 16, built in 1873, and remodeled in 1888; product, "Sheridan" foundry pig iron; annual capacity, 20,000 net tons. Henry S. Eckert, William M. Kaufman, and Isaac Eckert, owners.

Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery

county. One stack, 70 x 16, built in 1875, and first blown in in April, 1876; enlarged in 1889; Durham iron stoves; fuel, $\frac{3}{4}$ anthracite coal and $\frac{1}{4}$ coke; ores, magnetic, from Boyertown and Seisholtzville, Berks county, and foreign; specialty, mill pig iron; annual capacity, 38,000 net tons. Brand, "Warwick." Isaac Fegely, President; V. P. McCully, Secretary; Jacob Fegely, Treasurer; Edgar S. Cook, Manager. Selling agent, J. Wesley Pullman, 238 South Third st., Philadelphia. Number of furnaces in the Schuylkill region: 40 completed stacks, and one stack building.

UPPER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 55 x 14, built in 1853-4, and blown in April 14, 1854; rebuilt in 1881 and 1886; three iron stoves; ores, fossil, mined in the vicinity, and magnetic from New Jersey; product, gray forge and No. 2 foundry pig iron; annual capacity, 14,500 net tons. Brand, "Bloom."

Chulasky Furnace, B. B. Gearhart, Chulasky, Northumberland county. One stack, 42 x 14, built in 1846; ores mined on the property; specialty, soft gray forge pig iron; annual capacity, 6,500 net tons. Idle.

Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks, 39 x 14 and 50 x 14, built in 1840 and 1860, respectively; two iron stoves; open tops; ore, mostly native Clinton fossil; product, foundry pig iron; total annual capacity, 15,200 net tons.

Duncannon Furnace, Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. One stack, 60 x 15, built in 1853, and rebuilt in 1880; fuel, anthracite coal and coke; iron stoves; ores, Cornwall magnetic from Lebanon county and hematite from Mifflin county and from Virginia; specialty, mill pig iron; annual capacity, 20,000 net tons. Brand, "Duncannon." Will soon add two Whitwell stoves. *See Rolling Mills.*

Irondale Furnaces, Bloomsburg Iron Company, Bloomsburg, Columbia county. Two stacks, 36 x 12 and 36 x 14, built in 1844 and 1845; open tops; water-power; ores, local fossil and New Jersey magnetic; product, principally No. 2 foundry and mill pig iron, made from ore only; total annual capacity, 18,000 net tons. The foundry pig iron is very soft, open-grained, and strong; the mill pig iron is nearly neutral, and has great tensile strength. Brand, "Irondale." L. S. Wintersteen, President; J. J. Brower, Secretary and Treasurer.

Lackawanna Furnaces, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Five stacks: two built in 1849, one in 1852, one in 1854, and one in 1872; sizes, 73 x 20, 65 x 17, 70 x 18, 70 x 17, and 75 x 18; iron stoves; fuel, anthracite coal and coke; ores, chiefly magnetic, with some roasted carbonate, from Lake Champlain and Putnam county, New York; product, Bessemer pig iron; total annual capacity, 110,000 net tons. Brand, "Lackawanna." E. S. Mof-

fat, Superintendent of furnaces. New York office, 52 Wall st. *See Rolling Mills.*

Montour Iron and Steel Company, Danville, Montour county. Philadelphia office, 227 South Fourth st. Two stacks, each 52 x 15, built in 1842; iron stoves; fuel, anthracite coal and Clearfield coke; ores, local fossil and Lake Superior; product, foundry and forge pig iron; total annual capacity, 38,000 net tons. (A third stack was abandoned in 1880.) *See Rolling Mills.*

North Branch Furnaces, North Branch Steel Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Two stacks, 43 x 13 and 61 x 16, built in 1867 and 1869 respectively; both remodeled in 1884; fuel, anthracite coal and coke; ores, soft fossil, mined in Montour county, and hematite and magnetic from New York, New Jersey, and the Lake Superior region; product, foundry and mill pig iron; total annual capacity, 30,000 net tons. *See Rolling Mills.*

Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; fuel, anthracite coal; ore, fossil; product, principally foundry pig iron; annual capacity, 7,000 net tons. Dr. L. Rooke, Manager.

Number of furnaces in the Upper Susquehanna region: 17 stacks.

LOWER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Aurora Furnace, Schall, Steacy, and Denney Company, (incorporated,) Wrightsville, York county. Main office, York. One stack, 55 x 14½, built in 1867, rebuilt in 1874, remodeled in 1886-7, and new blowing engine of greater capacity added; two Whitwell stoves added in 1889; fuel, anthracite coal and coke; ores from York, Lancaster, and Lebanon counties; product, neutral forge and foundry pig iron; annual capacity, 20,000 net tons. *See Rolling Mills.*

Bird Coleman, Donaghmore, and North Cornwall Furnaces, W. C. Freeman, Chairman, Cornwall, Lebanon county. Four stacks. Bird Coleman Furnaces, owned by Cornwall Iron Company Limited; No. 1, 75 x 18, built in 1872-3, and rebuilt in 1885; No. 2, 75 x 18, built in 1879-80, and rebuilt in 1885. Donaghmore Furnace, owned by Cornwall Iron Company Limited; one stack, 44 x 14, built in 1855. North Cornwall Furnace, owned by Mrs. M. C. Freeman; one stack, 52 x 15, built in 1872-4. Equipped with Whitwell and pipe stoves. Use Cornwall ore exclusively; fuel, anthracite coal and coke; specialty, Bessemer pig iron. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia. *See Charcoal Furnaces.*

Cameron Furnace, Cameron Furnace Company, Middletown, Dauphin county. One stack, 47½ x 13½, first put in blast December 26, 1853, and rebuilt in 1856; fuel, anthracite coal and coke; ores, York and Cumberland hematite; product, principally forge pig iron; annual capacity, 9,000 net tons. Brand, "Cameron." James Young, President.

- Chestnut Hill Furnaces, Chestnut Hill Iron Ore Company, Jerome L. Boyer, Superintendent, Reading. Works at Columbia, Lancaster county. Two stacks: one, 60 x 15, built in 1854, and remodeled in 1881; and one, 60 x 15, built in 1868, and remodeled in 1886; (a third stack, No. 1, now abandoned, was built in 1845;) iron stoves; fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, Ebbvale, (Maryland,) and New Jersey; specialty, foundry pig iron; annual capacity, 45,000 net tons. Brand, "Chestnut Hill." Main office, 52 Wall st., New York; B. G. Clarke, President, and Charles E. Sturges, Treasurer.
- Chickies Furnaces, Chickies Iron Company, (successors to E. Haldeman & Co.,) Chickies, Lancaster county. Two stacks: No. 1, 65 x 12, rebuilt in 1887; original stack built in 1845, and blown in January 15, 1846; No. 2, 66 x 12, rebuilt in 1889; original stack built in 1854, and blown in in 1855; iron stoves; fuel, anthracite coal and coke; ores, magnetic, from Cornwall, Lebanon county, and Chestnut Hill brown hematite, from Silver Spring, Lancaster county; product, foundry and mill pig iron. Brand, "Chickies." Paris Haldeman, President; C. Ross Grubb, Vice-President; Horace L. Haldeman, Secretary and Treasurer. Selling agents, Justice Cox, Jr., & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; Stroud & Co., New York; James B. Scott & Co., Pittsburgh.
- Colebrook, Cornwall Anthracite, and Lochiel Furnaces, Robert H. Coleman, Lebanon, Lebanon county. Five stacks. Colebrook Furnaces, at Lebanon; No. 1, 80 x 18, built in 1881, and remodeled and enlarged in 1887; No. 2, 80 x 14, completed in November, 1882; Whitwell stoves. Cornwall Anthracite Furnaces, at Cornwall; No. 1, 38 x 12, built in 1854; No. 2, 38 x 13, remodeled in 1885; iron stoves. Lochiel Furnace, at Harrisburg; one stack, 65 x 14, first put in blast in April, 1873, and remodeled in 1886; Whitwell stoves. All use Cornwall ore; total annual capacity, 130,000 net tons.
- Conestoga Furnace, Peacock & Thomas, Lancaster, Lancaster county. Philadelphia office, 242 South Third st. One stack, 39 x 11½, built in 1846, and remodeled in 1872 and 1889; iron stove; ore, Lancaster county hematite exclusively; specialty, foundry pig iron, known as "Conestoga" iron; annual capacity, 6,500 net tons.
- Conewago Furnace, Conewago Iron Company, Middletown, Dauphin county. Formerly called Middletown Furnace. One stack, 45 x 11, built in 1853, and rebuilt in 1879; fuel, anthracite coal and coke; ores, Cornwall magnetic and Chestnut Hill hematite; product, "Chickies" pig iron, exclusively for the Chickies Iron Company. Paris Haldeman, President; Henry B. Grubb, Vice-President; Horace L. Haldeman, Treasurer; Frank Nisley, Secretary.
- Cordelia Furnace, Cordelia Iron Company, Cordelia, Lancaster county. Formerly called Kauffman Furnace. One stack, 50 x 13, built in 1848,

- and rebuilt in 1859; one Thomas iron stove; ores, hematite and magnetic from Pennsylvania, Maryland, and New Jersey; specialty, foundry pig iron; annual capacity, 9,000 net tons. Brand, "Cordelia." H. A. Muhlenberg, President; Wilson V. McHose, Secretary; Isaac McHose, Treasurer and General Manager.
- Katherine Furnace, C. W. Ahl's Son, Carlisle. Works at Boiling Springs, Cumberland county. One stack, 50 x 11, built in 1881-2; one Durham iron stove; fuel, anthracite coal and coke; ore, local brown hematite; product, neutral foundry and forge pig iron. Brand, "Carlisle."
- Lebanon Furnaces, Coleman & Brock, Managers, Lebanon, Lebanon county. Two stacks: one, 80 x 17, built in 1845, rebuilt in 1868, and again in 1885; the other, 65 x 17, built in 1872-3, put in blast in August, 1873; two sets of Whitwell stoves; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron; total annual capacity, 70,000 net tons. (A third stack, 36 x 12, built in 1847, has been torn down.)
- Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867, blown in December 23, 1867; remodeled in 1884; two Whitwell stoves; fuel, anthracite coal and coke; ores, principally Cornwall; specialty, red-short gray forge pig iron; annual capacity, 22,000 net tons. Brand, "Lebanon Valley."
- Marietta Furnaces, George Dawson Coleman, Marietta, Lancaster county. Two stacks: one, 50 x 12½, built in 1847, and remodeled in 1880; and one, 38 x 12, built in 1849; total annual capacity, 12,000 net tons. Idle for a number of years.
- Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two stacks, 52 x 13 and 75 x 14, built in 1855 and 1872, respectively; six Whitwell stoves; fuel, anthracite coal and coke; a variety of ores used; product, mill and Bessemer pig iron; total annual capacity, 40,000 net tons. Brand, "Paxton." Owned by the McCormick Estate. *See Rolling Mills.*
- Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Four stacks. No. 1, 60 x 14, built in 1872-3, and put in blast in October, 1873; remodeled in 1883, and supplied with two Whitwell stoves. No. 2, 80 x 20, built in 1874-6, put in blast in June, 1876; remodeled in 1877, and supplied with three Whitwell stoves. Nos. 3 and 4, each 70 x 18; No. 3 first put in operation in February, 1884, and No. 4 first put in operation in April, 1884; each has three Whitwell stoves. Fuel, anthracite coal and coke; ores, foreign and domestic hematite and magnetic; specialty, Bessemer pig iron; total annual capacity, 175,000 net tons. (Furnace No. 5, built in 1873-4, and remodeled in 1882, torn down in 1888.) *See Furnaces in Maryland. See Rolling Mills.*
- Richmond Furnace, Southern Pennsylvania Railroad and Iron and

Mining Company, Richmond Furnace, Franklin county. Formerly called Mount Pleasant Iron Works. One stack, 36 x 9½, built in 1865, and rebuilt in 1875; open top; fuel, anthracite coal and coke; ore from the Richmond mines, two miles from the furnace; annual capacity, 5,500 net tons. Not in blast for several years. T. B. Kennedy, Manager, Chambersburg.

St. Charles Furnaces, C. B. Grubb & Son, Lancaster, Lancaster county. Works at Columbia. Two stacks: No. 1, 52 x 14, built in 1853; the other, 57 x 12, built in 1845, formerly known as the Henry Clay, is now the St. Charles Furnace No. 2; remodeled in 1881; fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, and Conestoga; product, pig iron for boiler plate, bars, nails, or foundry work; total annual capacity, 25,000 net tons. Brand, "Grubb." Charles B. Grubb, Secretary and Treasurer; Joseph Eckman, Superintendent.

Swatara Furnace, James McCormick, Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854, and remodeled in 1880; fuel, anthracite coal and coke; ores, magnetic, brown hematite, and fossil, from Lebanon, Dauphin, and Juniata counties; product, gray forge pig iron; annual capacity, 8,000 net tons. Formerly called Union Deposit Furnace. Idle.

Vesta Furnace, Columbia Rolling Mill Company, Columbia. Furnace at Vesta, Lancaster county. Formerly called Musselman Furnace. One stack, 60 x 14, built in 1868, rebuilt in 1881, and remodeled in 1886; fuel, anthracite coal and coke; ores, hematite and magnetic, from Cumberland and Perry counties; product, neutral forge and foundry pig iron; annual capacity, 15,000 net tons. Brand, "Vesta." *See Rolling Mills.*

Number of furnaces in the Lower Susquehanna region: 35 stacks.

A cupola furnace, named Ruby Furnace, has been operated since 1884 by Albert Ferguson & Co., at Colebrook, Lebanon county, extracting pig iron from slag, using coke as fuel, and producing about 125 net tons a week.

JUNIATA VALLEY—COKE AND MIXED ANTHRACITE AND COKE.

Bellefonte Furnace Company, Bellefonte, Centre county. Main office, Bullitt Building, 133 South Fourth st., Philadelphia. One stack, 70 x 15, built in 1887, and put in blast February 1, 1888; three Whitwell stoves; fuel, coke; ore, native hematite; product, foundry and forge pig iron; annual capacity, 28,000 net tons. John Reilly, President; W. H. Hollis, Secretary and Treasurer; Thomas A. Shoemaker, Superintendent.

Blair Iron and Coal Company, Hollidaysburg, Blair county. General office, 218 South Fourth st., Philadelphia. Two stacks: No. 1, 59 x 13½, built in 1856, and rebuilt in 1883-4; No. 2, 51 x 10½, built in 1856; fuel, Bennington coke; ores, local hematite, Menominee hematite,

and foreign; product, Bessemer pig iron; total annual capacity, 30,000 net tons. John W. Townsend, President, and W. S. Robinson, Secretary and Treasurer, Philadelphia; John Fulton, General Manager, Johnstown; W. D. Libby, Superintendent, Hollidaysburg.

Centre Iron Company, Bellefonte, Centre county. Main office, Bullitt Building, 133 South Fourth street, Philadelphia. One stack, 70 x 15, built in 1887, and blown in in March, 1888; three hot-blast stoves, 50 x 18; fuel, Connellsville coke; ore, hematite, from Centre county; annual capacity, 30,000 net tons. James B. Coryell, President; B. K. Jamison, Vice-President; Charles A. Harte, Secretary and Manager; F. B. Owen, Treasurer. *See Rolling Mills.*

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Philadelphia office, 218 South Fourth st. One stack, 52 x 9, built in 1867; formerly operated with charcoal, but enlarged in 1879 to be run with coke; remodeled in 1888; ores, local brown hematite, carbonate, and red fossiliferous; product, gray forge pig iron; annual capacity, 6,000 net tons. *See Greenwood (charcoal) Furnace. See Rolling Mills.*

Everett Furnace, Joseph E. Thropp, Everett, Bedford county. One stack, 75 x 20, built in 1883-4, and first blown in December 9, 1884; three Siemens-Cowper-Cochrane stoves; fuel, Broad Top coke; ores, local fossil and hematite; annual capacity, 33,000 net tons.

Gap Furnace, Hollidaysburg and Gap Iron Company, Hollidaysburg. Furnace at McKee, Blair county. One stack, 49½ x 11½, built in 1840, and remodeled in 1877 and 1881; fuel, coke; ores, native hematite and soft fossil; annual capacity, 9,000 net tons. James Denniston, President and Treasurer; Aug. S. Landis, Secretary; J. L. Hartman, Manager.

Glamorgan Furnace, Glamorgan Iron Company, 228 South Fourth st., Philadelphia. Furnace at Lewistown, Mifflin county. One stack, 70 x 15½, built in 1872, and rebuilt in 1884-5; fuel, coke; ores, native fossil and hematite; product, foundry and gray forge pig iron; annual capacity, 30,000 net tons. Brand, "Glamorgan." (One stack, built in 1868, dismantled in 1885.) R. B. Wigton, President; C. B. Wigton, Secretary, Treasurer, and selling agent.

Kemble Furnaces, Kemble Iron Company, Riddlesburg, Bedford county. Two stacks, each 60 x 13, built in 1868 and 1870; the first was put in blast July 4, 1869, and the second March 4, 1871; fuel, Broad Top coke; ore, local fossil; product, principally a soft, strong, fluid foundry pig iron, with special capacity for absorbing scrap; total annual capacity, 20,000 net tons. Brand, "Kemble." George P. McBride, President; William H. Connell, Vice-President; John S. Slagle, Secretary and Treasurer; William Lauder, General Manager. Selling agents, Nimick & Co., Pittsburgh.

Lucy Furnace, John Whitehead, Huntingdon. Furnace at Mount

Union, Huntingdon county. Formerly called Matilda Furnace. One stack, $42\frac{1}{2} \times 10$, built in 1837, and rebuilt in 1869; remodeled in 1887; fuel, Latrobe and Connellsville coke; ores, fossil and Juniata Valley hematite; product, foundry and gray forge pig iron; annual capacity, 15,000 net tons. John Whitehead, Manager.

Marshall Furnace, Marshall Brothers, Newport, Perry county. Philadelphia office, 24 Girard avenue. One stack, 60×13 , built in 1871, and blown in in July, 1872; remodeled in 1888; two Durham iron stoves; fuel, anthracite coal and coke; ores, local magnetic, fossil, and hematite; product, foundry pig iron and gray forge pig iron for sheet and plate iron; annual capacity, 20,000 net tons. Brand, "Marshall." P. Hiestand, Superintendent.

Powelton Furnaces, Powelton Iron Company, 419 Walnut st., Philadelphia. Furnaces at Saxton, Bedford county. Two stacks: No. 1, 70×18 , built in 1880-1, and blown in October 16, 1882, has three 70×18 Whitwell stoves; No. 2, 71×17 , built in 1886-7, has three Whitwell stoves, each 60×18 ; fuel, Broad Top coke; ores, $\frac{2}{3}$ native from the firm's mines and $\frac{1}{3}$ Lake Superior; product, No. 1 foundry pig iron; total annual capacity, 50,000 net tons. Brand, "Powelton." Test of No. 1 pig iron by Baldwin Locomotive Works showed 23,582 pounds tensile strength per square inch and a shrinkage of $\frac{1}{8}$ of an inch per foot.

Rockhill Furnaces, Rockhill Iron and Coal Company, Rockhill Furnace, Huntingdon county. Telegraph address, Rockhill *via* Mount Union. Office, 320 Walnut street, Philadelphia. Two stacks, 65×17 and 65×15 , built in 1875, and blown in January 1, 1876; one stack rebuilt in 1886; fuel, Rockhill coke; ores, $\frac{2}{3}$ soft fossil and $\frac{1}{3}$ hematite, from the company's mines and from Shoenberger; specialty, foundry and gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Rockhill." William A. Ingham, President; Edward Roberts, Jr., Vice-President; William Boyd Jacobs, Secretary and Treasurer; Alfred W. Sims, Manager.

Number of coke and mixed anthracite and coke furnaces in the Juniata Valley: 16 stacks.

SHENANGO VALLEY—BITUMINOUS COAL OR COKE.

Claire Furnace Company Limited, Sharpsville, Mercer county. One stack, $75 \times 15\frac{1}{2}$, built in 1869, and rebuilt in 1886; four iron stoves; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 50,000 net tons. Branch office with M. A. Hanna & Co., Cleveland, Ohio. M. A. Hanna, Chairman; A. C. Saunders, Treasurer; A. M. Robbins, Secretary and General Manager, all at Cleveland; Josiah Robbins, Superintendent, Sharpsville.

Douglas Furnaces, Pierce, Kelly & Co., Sharpsville, Mercer county. Two stacks: one stack, 60×14 , built in 1870, and put in blast in March,

1871; rebuilt and enlarged in 1879; the other stack, 60 x 15, built in 1872, put in blast in February, 1873, and enlarged in 1881; iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, neutral foundry and forge pig iron; total annual capacity, 60,000 net tons. Brand, "Douglas."

Etna Furnaces, Etna Iron Works Limited, New Castle, Lawrence county. Two stacks, each 75 x 16, originally built in 1868; one rebuilt in 1882-3, and one rebuilt in 1886; three Whitwell stoves, each 65 x 18, added in 1889; fuel, coke; ore, Lake Superior; specialty, gray forge pig iron; annual capacity, 50,000 net tons. Brand, "Etna." Blowing capacity sufficient to run only one furnace at a time. *See Rolling Mills.*

Keel Ridge Furnace, P. L. Kimberly & Co., Sharon, Mercer county. One stack, 55 x 13½, built in 1869; iron stoves; fuel, raw coal and coke; ore, Lake Superior; product, principally No. 1 mill pig iron; annual capacity, 12,000 net tons. *See Rolling Mills.*

Mabel Furnaces, Perkins & Co. Limited, Sharpsville, Mercer county. Two stacks, each 65 x 14; No. 1 built in 1872, and No. 2 in 1880; both rebuilt in 1883; fuel, block coal and coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 50,000 net tons. Brand, "Mabel." S. Perkins, Jr., Chairman and Manager; L. C. Hanna, Secretary and Treasurer. Selling agents, M. A. Hanna & Co., Cleveland.

Neshannock Furnace, Crawford Iron and Steel Company, New Castle, Lawrence county. One stack, 78 x 17, built in 1872; first put in operation December 1, 1872; remodeled in 1883; four Whitwell stoves, three 60 x 16 and one 60 x 18; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 60,000 net tons. Brands, "Neshannock" and "Shenango." A. L. Crawford, President; William Patterson, Vice-President; James A. Crawford, Secretary and Treasurer; W. E. Reis, Manager.

Raney and Berger Iron Company, New Castle, Lawrence county. Two stacks: one 60 x 16, built in 1872, and put in blast in May, 1872; and one, 80 x 17, built in 1889, and put in blast September 6, 1889; fuel, coke; ore, Lake Superior; product, foundry pig iron; annual capacity of old stack, 40,000 net tons, and of new stack, 52,000 net tons. Brands, "Norway," "Crown," and "Hecla." L. Raney, President; George B. Berger, Treasurer.

Rosena Furnace, Oliver Iron and Steel Company, lessee, Pittsburgh. Furnace at New Castle, Lawrence county. One stack, 77 x 20, built in 1872, and first put in blast in June, 1873; iron stoves; fuel, coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity, 55,000 net tons. George E. Tener, Manager at the furnace. *See Rolling Mills.*

Sharon Furnace, Hall & Co., lessees, Sharon, Mercer county. One

stack, 60 x 12, built in 1845, and rebuilt in 1882; fuel, Connellsville coke; ore, Lake Superior hematite; product, foundry and mill pig iron; annual capacity, 25,000 net tons. Brand, "Sharon." George H. Hall, Manager.

Sharon Iron Company, Sharon, Mercer county. Two stacks: one, 72 x 15½, built in 1865, and rebuilt in 1887; and one, 72 x 15, built in 1876, and enlarged in 1883; Whitwell stoves; fuel, raw coal and coke; ore, Lake Superior; specialty, No. 1 mill pig iron; total annual capacity, 70,000 net tons. Brand, "Shenango." See *Rolling Mills*.

Sharpsville Furnace, Sharpsville Furnace Company, Sharpsville, Mercer county. One stack, built in 1847, and torn down in 1882; new iron stack, 65 x 13, blown in October 15, 1882; three iron stoves; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 40,000 net tons. Brand, "Sharpsville." James B. Pierce, Manager.

Spearman Furnaces, Spearman Iron Company, Sharpsville, Mercer county. Two stacks, each 63 x 14, built in 1872, blown in January 15, 1873, and September 20, 1875, and remodeled in 1882 and 1885; four Whitwell stoves; fuel, coke; ore, Lake Superior; product, foundry pig iron; total annual capacity, 60,000 net tons. Brand, "Spearman." J. J. Spearman, Manager.

Stewart Furnaces, Stewart Iron Company Limited, Sharon, Mercer county. Two stacks: No. 1, 66 x 13, built in 1870, and enlarged in 1882; No. 2, 70 x 14, built in 1872, and enlarged in 1883; iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, strictly Bessemer pig iron; total annual capacity, 62,000 net tons. Formerly called Valley Furnaces. S. McClure, Agent. See *Rolling Mills*.

Wheeler Furnace Company, Sharon, Mercer county. Three stacks in Mercer county. Ella Furnace, at West Middlesex, 70 x 15, built in 1882, occupies the site of the two Shenango Furnaces, which were built in 1859 and torn down in 1882. Fannie Furnace, at West Middlesex, 60 x 12½, first put in blast October 13, 1873, and remodeled in 1885. Alice Furnace, formerly called Florence Furnace, at Sharpsville, 60 x 12, built in 1868, put in operation in October, 1868; remodeled in 1882. Furnaces equipped with iron stoves. Fuel, coke; ore, Lake Superior; product, principally Bessemer pig iron; annual capacity of Ella Furnace, 40,000 net tons, of Fannie Furnace, 33,000 net tons, and of Alice Furnace, 26,000 net tons. Brand, "Wheeler." E. A. Wheeler, Manager. Pickands, Mather & Co., Cleveland, Ohio, selling agents.

Number of furnaces in the Shenango Valley: 23 stacks.

ALLEGHENY COUNTY—COKE.

Carrie Furnaces, Carrie Furnace Company, Pittsburgh. Two stacks at Rankin Station, Allegheny county, each 80 x 18; one removed from

Ohio, in 1883, and blown in February 29, 1884; five iron stoves; the other built in 1888-9, and blown in July 19, 1889; four Massick & Co. fire-brick stoves, each 70 x 19½; ore, Lake Superior; product, mill foundry, and Bessemer pig iron; total annual capacity, 75,000 net tons. Joseph S. Brown, President; E. S. Fownes, Secretary; H. C. Fownes, Treasurer; W. C. Fownes, Manager.

Clinton Furnace, Clinton Iron and Steel Company, Pittsburgh. One stack, 67 x 12, built in 1859 and remodeled in 1889; three hot-blast stoves; fuel, coke; ores, Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 20,000 net tons. *See Rolling Mills.*

Edgar Thomson Furnaces, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Seven completed stacks and two stacks building. Furnace A, 65 x 15, built in 1879, has four Siemens-Cowper-Cochrane stoves, each 65 x 15. Furnaces B and C, each 80 x 20, built in 1880, have eight Siemens-Cowper-Cochrane stoves, six 75 x 20 and two 75 x 21. Furnaces D and E, each 80 x 22, built in 1881, have six Siemens-Cowper-Cochrane stoves, each 78 x 21, and one Whitwell stove, 78 x 20. Furnaces F and G, each 80 x 22, built in 1886 and 1887, have seven Siemens-Cowper-Cochrane stoves, each 78 x 21. Furnaces H and I, each to be 90 x 22, building. Fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, Missouri, and foreign; product, Bessemer pig iron, spiegeleisen, and ferro-manganese. Combined annual capacity of completed furnaces, 450,000 net tons; annual capacity of furnaces building, 195,000 net tons. James Gayley, Superintendent of furnaces. *See Rolling Mills.*

Eliza Furnaces, Laughlin & Co. Limited, Pittsburgh. Three stacks: one 61 x 14, built in 1861, and enlarged in 1873 and 1874; one, 80 x 20, built in 1886-7, and blown in in June, 1887; and one, 80 x 23, built in 1888-9, and blown in in May, 1889; fuel, coke; ore, Lake Superior; total annual capacity, 160,000 net tons of Bessemer and 50,000 tons of mill pig iron. (One stack, built in 1861, was torn down in 1888.) Brand, "Eliza." Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.

Isabella Furnaces, Isabella Furnace Company, Etna, Allegheny county. Two stacks, each 75 x 20, built in 1872; each stack supplied with three 70 x 21 Whitwell stoves; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; total annual capacity, 180,000 net tons. Hugh Kennedy, Manager.

Lucy Furnaces, Carnegie, Phipps & Co. Limited, Fifty-first st., (branch office, 48 Fifth avenue,) Pittsburgh. Two stacks, each 75 x 20; No. 1 first put in blast in May, 1872, and No. 2 first put in blast September 27, 1877; seven Whitwell stoves; ores, mainly Lake Superior; product, Bessemer; forge, and foundry pig iron; total annual capacity,

about 150,000 net tons. Brand, "Lucy." James Scott, Superintendent. *See Rolling Mills.*

Monongahela Furnace Company, McKeesport, Allegheny county. One completed stack leased and two stacks building. Edith Furnace, at Allegheny City, 70 x 16, built in 1882 to replace the two Superior Furnaces built in 1862-3, and first put in operation in November, 1882; three improved Pollock stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 45,000 net tons. Furnaces A and B, commenced building in August, 1889, at McKeesport, Allegheny county; each to be 80 x 20; seven Cowper stoves; estimated annual capacity, 160,000 net tons. E. C. Converse, President; David W. Hitchcock, Vice-President; C. L. Steven, Secretary; W. S. Eaton, Treasurer; H. C. Crosby, Assistant Treasurer; Wm. B. Schiller, General Manager.

Shoenberger Furnaces, Shoenberger, Speer & Co., Pittsburgh. Two stacks: one 62 x 13½, and one 62 x 14, built in 1865; six Massick & Crook fire-brick stoves; fuel, coke; ores, Lake Superior, native, and foreign; product, Bessemer, foundry, and gray forge pig iron; total annual capacity, 85,000 net tons.

Soho Furnace, Moorhead-McCleane Company, Pittsburgh. One stack, 80 x 19, built in 1872, put in blast November 22, 1872; remodeled in 1888; improved Cowper stoves; fuel, Connellsville coke; ore, Lake Superior; product, gray forge, Bessemer, and special low-phosphorus pig iron; annual capacity, 70,000 net tons. Brand, "Soho." *See Rolling Mills.*

Number of furnaces in Allegheny county: 21 completed stacks, and 4 stacks building.

MISCELLANEOUS COKE—WESTERN PENNSYLVANIA.

Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Six stacks. Nos. 1, 2, 3, and 4 were built in 1853 and 1854; Nos. 1 and 2 were rebuilt in 1883, and are each 76 x 16; Nos. 3 and 4 were rebuilt in 1886, and are each 76 x 16; No. 5, 76 x 19, called also Centennial Furnace, was built in 1873-6, and blown in December 22, 1876; No. 6 is 76 x 19, and was first blown in July 20, 1879. Fuel Connellsville and Conemaugh coke; ores, brown hematite from Blair county, Pa., and red hematite from the Menominee range, Michigan. Specialty, Bessemer pig iron. The furnaces are equipped with sixteen Whitwell fire-brick and nine Player iron stoves. Total annual capacity, 325,000 net tons. (One stack at East Conemaugh, 51 x 11½, built in 1857, and rebuilt in 1883, was torn down in 1888, and will probably be rebuilt.) The furnaces of the Blair Iron and Coal Company, which are practically under the same management, add 30,000 net tons to this capacity, making the total 355,000 net tons. *See Rolling Mills.*

X 1-66
Cameron Iron and Coal Company, Emporium, Cameron county. Main office, Mutual Life Building, 54 Nassau st., New York. One stack, No. 1, 75 x 16, built in 1887-8, and blown in in November, 1888; three Siemens-Cowper stoves, each 70 x 18; fuel, coke; ores, local and Lake Superior; annual capacity, 40,000 net tons. Officers at New York: Nicholas C. Miller, President; H. Duncan Wood, Vice-President; George S. Middlebrook, Secretary; H. B. Hollins, Chairman Finance Committee. Harry S. Fleming, General Superintendent, at the works. This company operates its own iron-ore and coal mines and coke ovens. Sales agents, Jerome Keeley & Co., 206 Walnut Place, Philadelphia.

Charlotte Furnace Company Limited, Scottdale, Westmoreland county. Pittsburgh office, Room 404, Lewis Building. One stack, 65 x 16½, built in 1872-3, put in blast October 14, 1873; fuel, Connellsville coke; ores, Lake Superior, hematite from Blair and Centre counties, and carbonate from Fayette county; specialty, mill pig iron; annual capacity, 26,000 net tons. Brand, "Charlotte." Edwin Miles, Chairman; George K. Miles, Secretary and Treasurer; Nathaniel Miles, General Manager. Sales agents, Nimick & Co., Pittsburgh.

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks. Furnace No. 1, 77 x 19, built in 1790, rebuilt in 1870, 1876, and 1880; four Whitwell stoves, three 50 x 18 and one 50 x 22. Furnace No. 2, 78 x 19, first put in blast in May, 1880; two Whitwell stoves, 60 x 18. Fuel, Connellsville coke; ores, a large percentage of Lake Superior specular mixed with roasted native carbonates, with a small quantity of mill cinder to insure free working; product, mill and foundry pig iron, strong and of dark color; also make some Bessemer pig iron; total annual capacity, 100,000 net tons. Old stack was called "Union." Charles Parrish, President, Wilkesbarre, Pa.; Charles A. Harte, Secretary, Bullitt Building, Philadelphia; Harry W. Hazard, Treasurer and Superintendent, and Charles H. Kimball, Cashier, Dunbar. L. & R. Wister & Co., general agents, 257 South Fourth st., Philadelphia; A. H. Childs, agent, Pittsburgh.

Fairchance Furnace, Fairchance Furnace Company, Fairchance, Fayette county. Office, 111 Broadway, New York. One stack, 61 x 12½, built in 1887; fuel, coke; ores, ½ Lake Superior, balance native, running 33 per cent.; annual capacity, 12,000 net tons. This furnace has been built adjoining the ore mines and coke ovens, and about 1½ miles from the site of the old Fairchance Furnace, built in 1804, and abandoned and dismantled in 1887. George R. Sheldon, President; W. H. DeForest, Jr., Secretary and Treasurer; R. L. Martin, General Superintendent, Fairchance, Pa.

Oliphant Furnace, Fayette Coke and Furnace Company, Oliphant Furnace, Fayette county. Telegraph address, Uniontown or Fairchance. One stack, 55 x 12½, built in 1875-6, and rebuilt in 1886; e;

ores, local carbonate, Blair county, and Lake Superior; also use some mill cinder; product, mill pig iron; annual capacity, 12,000 net tons. A. W. Bliss, President and Treasurer, Uniptown; J. E. Springer, Superintendent, Oliphant Furnace; A. H. Childs, selling agent, Pittsburgh.

Rebecca Furnace, Kittanning Iron Company Limited, Kittanning, Armstrong county. One stack, 65 x 14½, first put in blast June 20, 1880; fuel, coke; ores, native and Lake Superior; product, forge and foundry pig iron; annual capacity, 31,000 net tons. Brands, "Kittanning" and "Rebecca." *See Rolling Mills.*

Red Bank Furnace, David & John D. Reynolds, Red Bank Furnace P. O., Clarion county. One stack, 45 x 12, built in 1859; fuel, coke; ore, local limestone; specialty, cold-short mill pig iron; annual capacity, 9,000 net tons. David Reynolds, Manager.

Number of coke furnaces in Western Pennsylvania outside of Allegheny county and the Shenango Valley: 14 stacks.

CHARCOAL.

Berlin Iron Works, F. R. Jackson, Berwick, Columbia county. Furnace at Glen Iron, Union county. One stack, 35 x 8, built in 1827; abandoned in 1856; revived in July, 1880; cold blast; ores, hematite and fossil; product, car-wheel and malleable pig iron; annual capacity, 4,000 net tons. W. J. Bolton, Superintendent.

Carrick Furnace, H. M. North, Columbia. Furnace at Metal, Franklin county. One stack, 37 x 9, built in 1828, and remodeled in 1880; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,800 net tons. Idle since 1884 and for lease.

Chestnut Grove Furnace, John C. Long, Carlisle. Furnace at Idaville, Adams county. One stack, 32 x 8½, built in 1830; cold blast; open top; ores, magnetic and hematite, from the neighborhood; product, charcoal pig iron, warranted strictly cold blast, for car-wheels, chilled rolls, malleable and steel castings, and for open-hearth steel; annual capacity, 1,600 net tons. Brand, "Chestnut Grove C. B."

Cornwall Furnace, (charcoal,) Cornwall Iron Company Limited, Cornwall, Lebanon county. One stack, 31 x 8, built in 1742; cold blast; annual capacity, 1,500 net tons. In excellent condition. W. C. Freeman, Chairman. *See Lower Susquehanna Furnaces.*

Eagle Furnace, Curtins & Co., Roland, Centre county. One stack, 29 x 8½, built in 1848; the original furnace was built in 1817, half a mile south of the present site; open top, open hearth, and closed tuyere; ore, Nittany Valley brown hematite; cold blast; water-power; annual capacity, 2,200 net tons. All the pig iron made is turned into blooms by charcoal forges, and used for flange iron. *See Rolling Mills. See Bloomaries.*

Falling Spring Furnace, Burkhart & Co., Chambersburg, Franklin coun-

ty. One stack, 40 x 8½, built in 1880, and remodeled in 1883-4; cold or warm blast; ore, local hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Falling Spring." Furnace in operation, but is for sale.

Greenwood Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Works at Greenwood, Huntingdon county. Philadelphia office, 218 South Fourth st. One stack, 52 x 9, built in 1864; remodeled in 1889; closed top; cold blast; ore, red fossiliferous, obtained in the vicinity; pig iron used for car-wheels and chilled rolls; annual capacity, 3,600 net tons. (One stack, built in 1833, not used since 1882.)

See Emma (coke) Furnace. See Rolling Mills.

Hecla Furnace, McCoy & Linn, Milesburg, Centre county. One stack, 32 x 8½, built in 1864; cold blast; water-power; open top; ore, hematite, from Nittany Valley; specialty, forge pig iron; entire product used in the forge and rolling mill of the firm; annual capacity, 2,000 net tons. (Old Hecla Furnace, built in 1820, was abandoned in 1864.)

See Rolling Mills. See Bloomaries.

Hopewell Furnace, Edward S. Buckley, 209 South Third st., Philadelphia. Furnace near Monocacy, Berks county. One stack, 30 x 7, built in 1759, and rebuilt in 1800; cold blast; water and steam power; ores, hematite and magnetic, obtained in the neighborhood; product, car-wheel pig iron; annual capacity, 1,200 tons. Idle since 1884.

Isabella Furnace, Joseph D. Potts, Barneston, Chester county. Telegraph address, Barneston, via Glen Moore. Philadelphia office, 234 South Fourth st. One stack, 60 x 7½, built in 1835, and rebuilt in 1864, 1881, and 1886; cold blast; product, car-wheel pig iron, made from magnetic and hematite ores, mined in Lancaster and Chester counties, with a mixture of Spanish and Lake Superior ores; annual capacity, 6,000 net tons. Brand, "Wyebrooke." William M. Potts, Manager. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

Jefferson Furnace, J. M. & H. Y. Kaufman, Auburn, Schuylkill county. Furnace at Jefferson Station. One iron stack, 33 x 8, first put in blast May 20, 1880; cold blast; ore, hematite, from Berks and Lehigh counties; specialty, pig iron for car-wheels and heavy rolls; weekly capacity, 50 net tons. (Old Jefferson Furnace, which was built in 1864 at Jefferson, was abandoned in 1879.)

Joanna Furnace, L. Heber Smith, Joanna Furnace, Berks county. One stack, 45 x 8½, built in 1792 by Potts & Rutter, and rebuilt in 1847; remodeled in 1889; hot or cold blast; Weimer blowing engine; bell and hopper top; ores, local magnetic and hematite; specialty, car-wheel pig iron; annual capacity, 4,500 net tons. Brand, "Joanna."

Maiden Creek Furnace, Jacob K. Spang, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold blast; open top; ores, Moselem hematite and local magnetic; product, pig iron for car-wheels and

chilled rolls; annual capacity, 2,500 net tons. Brand, "Maiden Creek."

Mont Alto Furnace, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph in office connecting with Western Union office at Chambersburg. One stack, 30 x 9, built in 1807-8, and size increased to 45 x 9½ in 1881; burned in April, 1889, and rebuilt in same year to 50 x 10; cold and warm blast; ore, exclusively brown hematite, from the furnace property; product, pig iron for car-wheels, chilled rolls, and best charcoal blooms; annual capacity, 12,000 net tons. Brand, "Mont Alto." George B. Wiestling, President and General Manager; Edward B. Wiestling, Treasurer. *See Bloomaries.*

Pine Grove Furnace, South Mountain Mining and Iron Company, Pine Grove Furnace P. O., Cumberland county. One stack, 53 x 9, built in 1770; remodeled in 1877 and 1883; hot blast; ore, hematite, from the furnace property; product, forge pig iron, for flange and fire-box iron, and car-wheel iron; annual capacity, 6,000 net tons. The company contemplates erecting a large anthracite and coke furnace. J. C. Fuller, President; W. H. Woodward, Treasurer; S. R. Still, Superintendent. *See Bloomaries.*

South Side Iron Company Limited, Boiling Springs, Cumberland county. One stack, 28 x 8½, built in 1798, and rebuilt in 1815; hot blast; water-power; ore, Cumberland county hematite; specialties, neutral forge pig iron and car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "South Side." Formerly called Carlisle Iron Works. J. C. Bucher, President; Asbury Derland, Superintendent.

Number of charcoal furnaces in Pennsylvania: 16 stacks. Total number of furnaces in Pennsylvania: 230 completed stacks, and 5 stacks building.

MARYLAND.

MIXED ANTHRACITE AND COKE.

Pennsylvania Steel Company, 208 South Fourth st., Philadelphia. Five completed stacks and two stacks building. Furnaces A and B, at Sparrow's Point, a few miles below Baltimore, each 85 x 22, built in 1888-9, and Furnaces C and D building, each to be 85 x 22; Whitwell stoves. Ashland Furnaces, at Ashland, Baltimore county, leased from the Ashland Iron Company, three stacks: Nos. 1 and 2, each 32 x 12, built in 1844; No. 3, 53 x 15, built in 1870, and blown in in 1871; Nos. 1 and 2 are blown by steam and water power, No. 3 by steam. Fuel, anthracite coal and coke; ores, foreign, from Spain, Africa, and Cuba; product, Bessemer pig iron; annual capacity of completed furnaces, 200,000 net tons. Furnace A blown in October 23, 1889. *See Furnaces in Pennsylvania. See Rolling Mills in Pennsylvania.*

Number of mixed anthracite and coke furnaces in Maryland: 5 completed stacks, and 2 stacks building.

COKE.

Antietam Iron Works, Thomas W. Ahl, Carlisle, Pa. Furnace near Sharpsburgh, Washington county. One stack, 50 x 11, built in 1845; water-power; fuel, coke; ore, brown hematite, from the vicinity of Harper's Ferry. (This is the third stack built on this site; the first one was built about 1775.) Idle since 1883 and for sale.

Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. One stack, 50 x 11½, built in 1873-4; fuel, Connellsville coke; ore, local hematite; product, mill and foundry pig iron; annual capacity, 9,000 net tons. Brand, "Catoctin." Thomas Gorsuch, President; L. R. Waesche, Secretary; George Houck, Treasurer. *See Charcoal Furnaces.*

Number of coke furnaces in Maryland: 2 stacks.

CHARCOAL.

Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. Two stacks, 32 x 8½ and 32 x 9, built in 1775 and 1856; open tops; hot blast; steam and water power; ore, local hematite; product, foundry pig iron; total annual capacity, 5,000 net tons. Brand, "Isabella." *See Coke Furnaces.*

Laurel Furnace, R. C. Hoffman & Co., 23 South Frederick st., Baltimore. Furnace at Locust Point, Baltimore. One stack, 50 x 9, built in 1846, and rebuilt in 1856, 1873, and 1882; warm blast; ore, Baltimore carbonate; product, car-wheel pig iron; annual capacity, 5,600 net tons. Brand, "Laurel." Idle and for sale.

Maryland Furnaces, H. William Ellicott & Sons, Jackson and West sts., Baltimore. Two stacks, 48 x 11 and 49 x 10, built in 1853 and 1870, and rebuilt in 1872 and 1873; moderately warm blast; ore, argillaceous, mined near Baltimore; specialty, car-wheel and malleable pig iron; total annual capacity, 12,000 net tons. Brand, "Maryland." H. W. Ellicott, Jr., Manager.

Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George's county. One stack, 36 x 8½, built in 1847; burned and rebuilt in 1888; open top; ore, carbonate, mined in neighborhood, roasted and crushed before using; pig iron used for car-wheels, guns, flange iron, shot and shell; annual capacity, 7,000 net tons. Brand, "Muirkirk." Selling agents, Robinson & Orr, Pittsburgh; Stroud & Co., New York; John L. Hogan & Co., Philadelphia.

Principio Furnace, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Whitaker Station, Baltimore and Ohio Railroad. One stack, 35 x 9, first built in 1723; present stack built in 1836; warm blast; water-power; ores, from the company's mines in Baltimore county, Md., and Iron Hill, New Castle county, Del.; specialty, car-wheel pig iron. Brand, "Principio." Building a new stack, 60 x 10. *See Bloomaries.*

Stickney Iron Company, 11 South Gay st., Baltimore. Two stacks: Furnace A, 50 x 9½, built in 1854, rebuilt in 1871; hot blast; Baltimore ore exclusively used. Brand, "Stickney Iron Co." Furnace B, 48 x 11, completed and put in blast May 15, 1882; hot blast; ores, a mixture of Baltimore and foreign. The pig iron produced is specially adapted to malleable castings and car-wheels; annual capacity of A, 5,000 net tons, B, 10,000 net tons. George H. Stickney, President; William Harvey, Secretary. Reed, Stickney & Co., agents.

Number of charcoal furnaces in Maryland: 9 completed stacks, and one stack building. Total number of furnaces in Maryland: 16 completed stacks, and 3 stacks building.

VIRGINIA.

COKE.

Buena Vista Iron Company, Buena Vista, Rockbridge county. Philadelphia office, Bullitt Building. Building one coke stack, 70 x 16; three Whitwell stoves. Clarence M. Clark, President, Philadelphia, Pa.; J. D. Anderson, Secretary and Treasurer, Lexington, Va.

Crozer Furnaces, Crozer Iron Company, Roanoke, Roanoke county. General office at Upland, Delaware county, Pa. Two stacks at Roanoke: Furnace A, 70 x 16, built in 1882-3, and first put in operation May 29, 1883; Furnace B, 70 x 15, built in 1889, and blown in October 19, 1889; six Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, (A,) forge iron, (B,) foundry iron; annual capacity, 70,000 net tons. Brand, "Crozer." Samuel A. Crozer, President; W. H. H. Robinson, Treasurer; Francis E. Weston, Secretary; T. J. Houston, General Manager.

Gem Furnace, Shenandoah Furnace Company, Milnes, Page county. One stack, 70 x 16, built in 1882, and first blown in February 8, 1883; remodeled in 1889; three Whitwell stoves; fuel, Connellsville coke; ore, brown hematite, mined on the furnace property; product, foundry and gray forge pig iron; annual capacity, 40,000 net tons. Brand, "Gem." David W. Flickwir, President, Roanoke, Va.; E. P. Botsford, Secretary and Treasurer, and Daniel King, Manager, Milnes.

Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. One stack, 60 x 12½, built in 1881-2, and first put in blast in March, 1882; rebuilt to use coke in 1887-8, and blown in January 2, 1889; two Whitwell stoves; ores, local brown hematite and limonite; fuel, Pocahontas coke; product, foundry and forge pig iron; annual capacity, 16,000 net tons. Main office, 49 Cliff st., New York. George H. Seeley, President; Jordan L. Mott, Vice-President; J. T. Pearson, Secretary and Treasurer; Austin Farrell, General Manager, at the works. Selling agents, George H. Hull & Co., Louisville and New York; N. S. Bartlett & Co., New York and Boston.

Longdale Iron Company, Longdale, Alleghany county. Two stacks: one stack, (formerly Lucy Selina,) 59 x 14, built in 1827, rebuilt in 1873, and again in 1889; the other stack, 60 x 14, first put in blast in February, 1881; fuel, West Virginia coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Longdale." H. Firmstone, President; J. E. Johnson, Manager. Matthew Addy & Co., Cincinnati, sole sales agents.

Low Moor Furnace, Low Moor Iron Company of Virginia, Low Moor, Alleghany county. Two stacks: one, 74 x 18, built in 1880, and one, (alternate stack,) 80 x 18, built in 1887; five Whitwell stoves; fuel, New River coke, made at the furnace in 150 ovens; ore, local brown hematite; product, foundry pig iron; annual capacity, 50,000 net tons. Foundry and machine shops for private use connected with the works. John Means, President; H. M. Bell, Vice-President; John F. Winslow, Chairman Executive Committee; E. A. Low, Treasurer, and A. Aug. Low, Assistant Treasurer, 31 Burling Slip, New York; Henry Merry, General Superintendent. Western sales agent, Thomas A. Mack, Cincinnati.

Lynchburg Furnace, E. Burd Grubb, lessee, Lynchburg, Campbell county. One stack, 60 x 11½, first put in blast in December, 1880; remodeled in 1882, and again in 1884; fuel, Pocahontas coke; ores, local brown hematite and magnetic; annual capacity, 14,000 net tons. Owned by Lynchburg Iron Company, 220 South Third st., Phila.

Nannie B. Furnace, Virginia Nail and Iron Works Company, Lynchburg, Campbell county. One stack, 65 x 12½, at Reusens, on the Richmond and Alleghany Railroad, built in 1887-8, and blown in June 12, 1888; water-power; two iron stoves; fuel, coke; ores, specular and brown hematite; product, forge pig iron; annual capacity, 17,000 net tons. Brand, "Virginia." *See Rolling Mills.*

Princess Furnace, D. S. Cook, Glen Wilton, Botetourt county. Main office, Wrightsville, Pa. One stack, 60 x 13, built in 1883-4; four Gordon-Whitwell-Cowper stoves; fuel, New River coke; ores, hematite and manganese, mined on the furnace property; product, soft, strong, and very fluid foundry pig iron; annual capacity, 20,000 net tons. Brand, "Princess." T. D. Kauffelt, Manager.

Pulaski Iron Company, Pulaski City, Pulaski county. Main office, 330 Walnut st., Philadelphia. One stack, 75 x 17, built in 1887, and blown in in February, 1888; three Whitwell stoves; fuel, Pocahontas coke; ores, brown hematite and magnetic, from Cripple Creek region, Va., and Cranberry mines, N. C.; product, foundry and forge pig iron; annual capacity, 50,000 net tons. The company contemplates building another furnace of the same size. A. J. Dull, President, Harrisburg, Pa.; A. S. Patterson, Secretary and Treasurer, Philadelphia; John W. Eckman, General Manager.

Rockbridge Furnace, Virginia Iron Company, Goshen Bridge, Rockbridge county. One stack, 85 x 18, built in 1882-3, and first put in blast May 1, 1883; three Siemens-Cowper-Cochrane stoves; fuel, Connelssville and New River coke; ore, brown hematite; product, foundry and forge pig iron; annual capacity, 60,000 net tons. Brands, "Rockbridge" for strong foundry and forge and "Goshen" for soft silvery. Formerly called Victoria Furnace. Henry D. Turney, President, Columbus, Ohio; James S. Wheeler, Secretary and Treasurer, and Kenneth Robertson, Manager, Goshen Bridge. Selling agents, Chamberlain, Wheeler & Co., Columbus, Chicago, and St. Louis.

Salem Furnace Company, Salem, Roanoke county. Building one coke stack, 75 x 14½. D. B. Strouse, President; F. H. Chalmers, Secretary; John M. Evans, Treasurer; F. E. Bachman, Superintendent.

Number of coke furnaces in Virginia: 13 completed stacks, and 2 stacks building.

CHARCOAL.

Cave Hill Furnace, Wytheville, Wythe county. One stack, 47 x 10, built in 1881-2; open top; cold blast; ores, red and brown hematite and magnetic, mined near the furnace; product, car-wheel pig iron; daily capacity, 10 net tons. Owned by S. R. Sayers, Robert Sayers, and George W. Palmer. Idle and for sale.

Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe county. One stack, 32 x 9, built in 1832; cold blast; water-power; ore, mined on the furnace property; specialty, car-wheel pig iron; daily capacity, 8 net tons. Selling agents, R. C. Hoffman & Co., Baltimore. D. P. Graham, part owner and General Manager.

Columbia and Liberty Furnaces, George W. Pearson, Trenton, New Jersey. Two stacks in Shenandoah county. Columbia Furnace, at Columbia Furnace P. O., 32 x 10, built in 1809, and rebuilt in 1829. Liberty Furnace, at Liberty Furnace P. O., 30 x 9½, built in 1821. Both furnaces are operated with cold blast; ores, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 4,000 net tons. Both stacks are out of blast.

Foster's Falls Furnace, Foster's Falls Mining and Manufacturing Company, Foster's Falls, Wythe county. Furnace on Cripple Creek branch of N. & W. R. R. One stack, 35 x 8, built in 1881; open top; cold blast; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. Brand, "Foster's Falls." M. B. Tate, President; J. W. Robinson, Secretary and Treasurer; J. A. Dyer, Manager. Sales agents, R. C. Hoffman & Co., Baltimore.

Lobdell Car-wheel Company, Wilmington, Delaware. Three stacks. Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built from 1870 to 1874, and rebuilt in 1882. Walton Furnace, at Max Meadows, Wythe county, 33 x 8½, built in 1872. White Rock Furnace, in Smythe county, five miles from Rural Retreat Station, Wythe county, 38 x 8½,

- built in 1875, and blown in August 9, 1875. All use cold blast; ore, local brown hematite; total annual capacity, 6,000 net tons. The company will give up the lease of Walton Furnace at the close of 1889. George G. Lobdell, President; William W. Lobdell, Vice-President; George G. Lobdell, Jr., Secretary and Treasurer; J. H. Wissler, Supt.
- Norma Furnace, Clinch Valley Coal and Iron Company, 134 South Fourth st., Philadelphia. Furnace on Cripple creek, Wythe county. One stack, 41 x 13, built in 1880, and blown in March 1, 1882; cold blast; ores, local red and brown hematite; product, No. 2 foundry pig iron; daily capacity, 15 net tons. Brand, "The Norma Iron Co." Evans R. Dick, President; Thomas R. Patton, Secretary; William A. Dick, Treasurer; George McCall, General Manager.
- Radford Furnace, Radford Iron Company, Radford Furnace P. O., Pulaski county. One stack, 35 x 10, built in 1868; warm blast; Richard Wood, President, 400 Chestnut st., Philadelphia. Idle since 1887.
- Reed Island Furnace, Reed Island Iron Company, Reed Island, Wythe county. Furnace in Pulaski county, on Reed Island branch of N. & W. R. R. One stack, 33 x 9, first put in blast April 28, 1881; cold blast; open top; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. R. C. Hoffman, President; J. W. Robinson, Secretary and Treasurer; W. R. Tipton, Superintendent. Sales agents, R. C. Hoffman & Co., Baltimore.
- Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace, Botetourt county. Telegraph address, Eagle Rock, Virginia. New York office, 45 Exchange Place. One stack, 32 x 10, built in 1869; hot and cold blast; open top; water-power; annual capacity, 4,000 net tons. Eugene Kelly, President and Treasurer; W. Plunket, Secretary; H. S. Dakin, Superintendent. Idle since 1883.
- Sinking Creek Iron Works, J. Wilcox Brown, Newport, Giles county. Telegraph address, Christiansburg Depot. One stack, 35 x 9½, built in 1873; warm blast; water-power. E. P. Williams, Superintendent. Idle since 1882.
- Van Buren Furnace, Dr. Frank King, Van Buren Furnace, Shenandoah county. Telegraph address, Woodstock. One stack, 37½ x 9, built in 1850, rebuilt in 1870; cold blast, but arranged for hot; ore, local hematite; annual capacity, 2,500 net tons.
- Wythe and Speedwell Mining and Iron Manufacturing Company, Speedwell, Wythe county. Telegraph address, Crockett's Depot. Five stacks on Cripple creek, in Wythe county: Beverly Furnace, 33 x 9, built in 1880; Eagle Furnace, 34 x 9, built in 1863, rebuilt in 1881; Raven Cliff Furnace, 29 x 9, built in 1810, rebuilt in 1876; Speedwell Furnace, 32 x 9, built in 1873-4; Wythe Furnace, 25 x 8, built in 1819, and rebuilt in 1873; all cold blast; open tops; ores, Cripple creek red and brown hematite; product, car-wheel pig iron; total annual capacity, 10,000 net tons. J. W. Robinson, President; J. H. Shuff,

Secretary, Treasurer, and General Manager. Selling agents, R. C. Hoffman & Co., Baltimore. *See Forges.*

Number of charcoal furnaces in Virginia: 19 stacks. Total number of furnaces in Virginia: 32 completed stacks, and 2 stacks building.

COKE FURNACES PROJECTED.

Graham Furnace Company, Bullitt Building, Philadelphia. Contract made for a furnace, 70 x 16, at Graham, Tazewell county. Clarence M. Clark, President; E. J. Collins, Secretary and Treasurer.

Roanoke Furnace Company, Roanoke, Roanoke county. Contract made for a furnace, 70 x 16; three Whitwell stoves. Henry King, Manager. Two furnaces at Radford, Montgomery county.

WEST VIRGINIA.

BITUMINOUS COAL OR COKE.

Belmont Furnace, Belmont Nail Company, Wheeling, Ohio county. One stack, 60 x 16, first blown in September 4, 1875; fuel, Connellsville coke; ores, Lake Superior; specialty, Bessemer pig iron; annual capacity, 36,000 net tons. Brand, "Belmont." N. Riester, Furnace Manager. *See Rolling Mills.*

Bettie Furnace, Black Band Iron and Coal Company, E. M. Farnsworth, Receiver, Spring Hill, Kanawha county. One stack, 50 x 10½, built in 1882-83; fuel, raw bituminous coal; ores, local blackband, block, and limonite; daily capacity, 30 net tons. A. M. Wooldredge, Manager.

Irondale Furnace, F. Nemegyei, Independence, Preston county. Telegraph address, Newburg. New York office, 35 Broadway. One stack, 60 x 13½, built in 1861, and rebuilt in 1886; Gordon-Whitwell-Cowper stoves; fuel, coke manufactured from coal mined on the property; ores, a mixture of half and half limonite and hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 18,000 net tons. Brand, "F. N."

Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1874; fuel, coke; annual capacity, 12,000 net tons. William Rotch Wister, President, and C. Gilpin, Jr., Secretary and Treasurer, Philadelphia; D. C. Boyce, Manager. Idle since 1884, and likely to remain so for some time.

Riverside Furnace, Riverside Iron Works, Wheeling, Ohio county. Furnace at Benwood, Marshall county. One stack, 75 x 17, built in 1871-2, first blown in February 14, 1872, and remodeled in 1876; entirely rebuilt in 1889; fuel, Connellsville coke; ores, Missouri, Lake Superior, and foreign; product, Bessemer pig iron; annual capacity, 55,000 net tons. Brand, "Riverside." *See Rolling Mills. See Miscellaneous Bituminous Furnaces in Ohio.*

Top Mill Furnace, Wheeling Iron and Nail Company, Wheeling. One stack, 65 x 17, built in 1873-4, and first blown in October 3, 1878; remodeled in 1888; fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 50,000 net tons. *See Rolling Mills.*

Number of furnaces in West Virginia: 6 bituminous stacks.

KENTUCKY.

BITUMINOUS COAL OR COKE.

Ashland Furnaces, Ashland Coal and Iron Railway Company, Douglas Putnam, Jr., General Superintendent, Ashland, Boyd county. Two stacks: one, 62 x 16, first blown in August 31, 1869, and one, 64 x 15½, built in 1887; seven Whitwell stoves; fuel, raw coal; ores, from Bath county; specialty, American Scotch pig iron; total annual capacity, 40,000 net tons. Brand, "Ashland." John Means, President; John G. Peebles, Vice-President; Robert Peebles, Secretary and Treasurer.

Licking Furnace, Newport, Campbell county. One stack, 65 x 16, built in 1859, enlarged in 1869; annual capacity, 17,000 net tons. George Weideman and associates, owners. Idle and for sale. *See Rolling Mills.*

Norton Iron Works, Ashland, Boyd county. One stack, 66 x 16, built in 1873, and blown in February 16, 1874; remodeled in 1877; four Whitwell stoves, each 50 x 16; ore, native; fuel, raw coal; product, soft pig iron; annual capacity, 20,000 net tons. Brand, "Norton." Selling agents, Rogers, Brown & Co., Cincinnati. *See Rolling Mills.*

Paducah Furnace, Paducah Iron Company, Paducah, McCracken county. Building one stack, 70 x 14, to use machinery removed from Nova Scotia (Mo.) Furnace; two Massick & Crook stoves; fuel, Connellsville coke. Thomas Howard, President, and R. J. Lackland, Treasurer, St. Louis, Mo.; W. W. Powell, Vice-President, Hugh Mulholland, Jr., Secretary, and Thomas J. Scott, Superintendent, Paducah.

Number of bituminous furnaces in Kentucky: 4 completed stacks, and one stack building.

CHARCOAL.

Bellefonte Furnace, Means and Russell Iron Company, Ashland, Boyd county. Furnace in Greenup county. One stack, 33 x 10½, built in 1826; open top; product, "Bellefonte" warm blast charcoal pig iron; annual capacity, 3,000 net tons. John Russell, President; C. W. Means, Secretary; Wm. B. Seaton, General Manager.

Estill Furnace, Kentucky Union Land Company, Red River Iron Works, Estill county. One stack, 32 x 10, built in 1831; cold blast; annual capacity, 3,000 net tons.

Hunnewell Furnace, Eastern Kentucky Railway Company, Greenup, Greenup county. Telegraph address, Riverton. Furnace at Hunnewell. One stack, 48½ x 10, built in 1852, and rebuilt in 1870; hot blast; open top; limestone, kidney, and block ores; specialty, foun-

dry pig iron; annual capacity, 6,000 net tons. Brand, "Hunnewell." Nathaniel Thayer, President; H. W. Bates, Vice-President; E. B. Townsend, Secretary and Treasurer; W. J. Worthington, Superintendent of furnace.

Number of charcoal furnaces in Kentucky: 3 stacks. Total number of furnaces in Kentucky: 7 completed stacks, and one stack building.

PROJECTED.

Coke and charcoal furnaces are projected at Middlesborough, Bell county.

TENNESSEE.

BITUMINOUS COAL OR COKE.

Chattanooga Iron Company, Chattanooga, Hamilton county. Georgia Mining, Manufacturing, and Investment Company, lessee. One stack, 61 x 13, completed in 1874, and blown in in September, 1874; rebuilt in 1885; fuel, Dade county (Ga.) coke; ore, brown hematite; specialty, foundry pig iron; annual capacity, 20,000 net tons. Joseph E. Brown, President, and Elijah A. Brown, Secretary and Treasurer, Atlanta, Ga.; John W. Hoffman, General Manager, 333 Walnut st., Philadelphia. Sole sales agents, J. W. Hoffman & Co., Philadelphia.

Citico Furnace, Citico Furnace Company, Chattanooga, Hamilton county. One stack, 69 x 16, built in 1883, and first put in blast in April, 1884; three Whitwell stoves; fuel, coke, from Pocahontas and Etna coal; ores, Tennessee and Georgia red and brown hematite; product, forge and foundry iron; annual capacity, 35,000 net tons. Brand, "Citico." H. S. Chamberlain, President; W. E. Raht, Secretary.

Dayton Coal and Iron Company Limited, Dayton, Rhea county. Main office, 10 Johnston Building, Cincinnati, Ohio. Two stacks, one, 75 x 20, and one, 75 x 18, completed in 1885; fuel, coke; six Whitwell stoves; ores, Tennessee fossil and Georgia hematite; product, foundry pig iron; total annual capacity, 80,000 net tons. Brand, "Dayton." Charles Stead, Chairman Board of Directors, Saltaire, England; W. J. Isaacson, Managing Director, Cincinnati; George Jamme, General Manager, Dayton, Tenn.

Rockwood Furnaces, Roane Iron Company, Rockwood, Roane county. Office at Chattanooga. Two stacks, 65 x 15 and 65 x 14, built in 1867 and 1872; fuel, raw coal and coke; total annual capacity, 40,000 net tons. H. S. Chamberlain, President; D. E. Rees, Secretary; M. M. Duncan, Superintendent of furnaces. *See Rolling Mills.*

Tennessee Coal, Iron, and Railroad Company, Nashville. Four stacks: The Sewanee Furnace, at Cowan, Franklin county, is 65 x 15, first put in blast in June, 1880; three Whitwell stoves; ore, soft red fossiliferous from the company's Alabama mines, and brown hematite from Georgia. Brand, "Sewanee." The South Pittsburg Furnaces, at

South Pittsburg, Marion county, three stacks: No. 1, 70 x 18, first blown in in May, 1879; No. 2, 70 x 18, completed in 1881, and first blown in in March, 1882; No. 3, 75 x 17, built in 1887-8, and first blown in in March, 1888; seven Whitwell stoves; ore, chiefly hard red fossiliferous, from the Inman mines of the company near South Pittsburg. Brand, "South Pittsburg." Product, foundry pig iron; fuel, coke, made in the company's ovens at Tracy City and at Whitwell; annual capacity, of Sewanee Furnace, 25,000 net tons, of South Pittsburg Furnaces, 100,000 net tons. Thomas C. Platt, President, New York; Wm. M. Duncan, 1st Vice-President, Nashville; J. F. B. Jackson, 2d Vice-President, Birmingham, Ala.; James L. Gaines, 3d Vice-President and General Manager for Tennessee, South Pittsburg; H. G. Bond, General Manager for Alabama, Ensley, Ala.; James Bowron, Secretary and Treasurer, H. D. Cooper, Auditor and Assistant Secretary, and S. Kirkpatrick, General Purchasing Agent, Nashville. J. Lodge, Superintendent South Pittsburg Division; J. A. Short, Superintendent Cowan Division. *See Furnaces in Alabama.*

Number of bituminous coal or coke furnaces in Tennessee: 10 stacks.

CHARCOAL.

Aetna Furnace, Aetna Iron Company, Nashville. Works at Aetna, Hickman county. One stack, 55 x 11, built in 1886, and first put in blast November 13, 1886; hot or cold blast; two Whitwell stoves; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 net tons. Brand, "Aetna." James C. Warner, President; G. M. Fogg, Vice-President; Leslie Warner, Secretary and Treasurer; Percy Warner, General Manager; William E. McNeilly, Assistant Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati.

Butler Furnace, R. R. Butler, Mountain City, Johnson county. One stack, 30 x 8, built in 1881, and first blown in in October, 1881; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Butler." Not in blast since 1885.

Cumberland Furnace, Drouillard Iron Company, Nashville. Works at Cumberland Furnace P. O., Dickson county. One stack, 37 x 9½, built in 1825; hot blast; annual capacity, 4,000 net tons. J. P. Drouillard, President; Edgar Jones, Secretary; R. B. Stone, Superintendent. Will not be again operated until a railroad is built to the furnace.

La Grange Furnace Company, Stribling, Stewart county. General office, Nashville. Telegraph address, Stribling, *via* Danville. One stack, 65 x 12, built in 1832, and rebuilt in 1880 and 1884; hot blast; ore, local brown hematite; specialty, machinery and foundry pig iron; annual capacity, 18,000 net tons. Brand, "La Grange." James C. Warner, President; Archer Brown, Vice-President; Leslie Warner, Secretary and Treasurer; W. E. McNeilly, General Manager and Assistant Sec-

retary and Treasurer; D. P. Wrenne, Superintendent, at the works. Selling agents, Rogers, Brown & Co., Cincinnati.

Nashville Furnace Company, West Nashville, Davidson county. Two stacks, each 60 x 12, built in 1887-8, and blown in May 15, 1888; four Gordon-Whitwell-Cowper stoves; fuel, either coke, from Tracy City, or charcoal, made at the furnace; ore, brown hematite, from Lawrence county; product, foundry pig iron; annual capacity, 36,000 net tons. The company also operates wood alcohol works. H. W. Buttorff, President; E. W. Cole, Vice-President; James Q. Moore, Secretary and Treasurer; John D. Hanby, Superintendent.

Speedwell Furnace, Knoxville Car-wheel Company, Knoxville. Furnace at Stony Creek, Carter county. One stack, 41 x 9, built in 1880; warm blast; ores, local red and brown hematite, limonite, and manganese; product, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Speedwell." (Carter Furnace, built in 1840, was abandoned in 1887.) Charles H. Brown, President; W. P. Washburn, Vice-President; D. A. Carpenter, Secretary and Treasurer; J. J. Traver, Superintendent of furnace; James Esdale, Superintendent of wheel works.

Warner Furnaces, Warner Iron Company, Nashville. Two stacks in Hickman county: No. 1, at Warner, 55 x 11, first put in blast November 12, 1881; No. 2, formerly called Standard Furnace, at Goodrich, 45 x 9, first blown in December 23, 1885; hot or cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 20,000 net tons. Brand, "Warner." James C. Warner, President; Leslie Warner, Secretary and Treasurer; Percy Warner, Vice-President and General Manager; William E. McNeilly, Assistant Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati.

Number of charcoal furnaces in Tennessee: 9 stacks. Total number of furnaces in Tennessee: 19 stacks.

CONTEMPLATED.

J. D. Kase contemplates erecting a coke furnace at Athens, McMinn county.

NORTH CAROLINA.

CHARCOAL.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 240 South Third st. One stack, 50 x 10, built in 1883-4, and first put in blast April 16, 1884; hot and cold blast; ore, magnetic, mined on the property; annual capacity, 6,000 net tons. Brand, "Cranberry." Frank Firmstone, President; J. S. Wise, Secretary and Treasurer; C. H. Nimson, General Manager.

Rehoboth Furnace, J. E. Reinhardt, Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810; cold blast; water-power; ore, magnetic; annual capacity, 1,200 net tons. Idle since 1883. Property for sale.

Number of furnaces in North Carolina: 2 charcoal stacks.

GEORGIA.

COKE.

Cherokee Iron Works, Cherokee Iron Company, Cedartown, Polk county. One stack, 60 x 14, built in 1874-5, and first blown in March 22, 1877, on charcoal; rebuilt and changed to coke in 1885; fuel, Glen Mary and Flat Top (Va.) coke; ore, brown hematite, mined near the works; annual capacity, 20,000 net tons. Brand, "Cherokee." A. G. West, President and Superintendent; J. Hull Browning, Treasurer, 408 Broome st., New York; J. R. Barber, Secretary. Selling agents, George H. Hull & Co., Louisville, Ky.

Rising Fawn Furnace, Walker Coal and Iron Company, Rising Fawn, Dade county. Georgia Mining, Manufacturing, and Investment Company, lessee. One stack, 65 x 17, built in 1873-5, put in blast June 18, 1875; four Whitwell stoves, each 60 x 16; ore, fossiliferous and brown hematite, mined on the company's property; product, foundry pig iron; annual capacity, 35,000 net tons. Brand, "Rising Fawn." Joseph E. Brown, President, Julius L. Brown, Vice-President, and Elijah A. Brown, Secretary and Treasurer, Atlanta, Ga.; John W. Hoffman, General Manager, 333 Walnut st., Philadelphia. Sole sales agents, J. W. Hoffman & Co., Philadelphia.

Number of coke furnaces in Georgia: 2 stacks.

CHARCOAL.

Etna Furnace, Etna Furnace Company, Etna P. O., Polk county. One stack, 43 x 9½, built in 1870; rebuilt in 1889; ore, brown hematite, mined on the property; product, strictly first-class car-wheel pig iron; annual capacity, 10,000 net tons. Brand, "Etna." D. B. Hamilton, President, Etna; A. S. Hamilton, Secretary and Treasurer, Rome, Ga.

Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located eight miles north of Rome. One stack, 60 x 10, built in 1874; annual capacity, 5,000 net tons. Edward Nichols, President and General Manager. Idle since 1884.

Tallapoosa Furnace, Tallapoosa Furnace Company, Tallapoosa, Haralson county. One stack, 60 x 11, built in 1888-9, to be blown in in January, 1890; one Player iron stove; closed top; cold and warm blast; ore, local brown hematite; product, car-wheel and foundry pig iron; annual capacity, 10,000 net tons. Brand, "Tallapoosa." E. P. Carpenter, President; James A. Burns, Vice-President and General Manager; J. R. Knapp, Secretary; R. L. Spencer, Treasurer.

Number of charcoal furnaces in Georgia: 3 stacks. Total number of furnaces in Georgia: 5 stacks.

PROJECTED.

Furnaces at Cartersville, Bartow county, by the Etowah Iron Company.

ALABAMA.

COKE.

Bessemer Iron and Steel Company, Bessemer, Jefferson county. Building two stacks, each 65 x 17; six Whitwell stoves; fuel, Alabama coke; H. F. DeBardeleben, President; T. L. Gilmer, Secretary; Arthur Pelzer, Treasurer; J. H. McCune, Manager.

Bibb Furnace, Alabama Iron and Steel Company, Brierfield, Bibb county. One stack, 50 x 12, built in 1864 to use charcoal, rebuilt in 1881, and remodeled in 1886 to use coke; ore, brown hematite, mined in the vicinity; annual capacity, 14,000 net tons. *See Rolling Mills.*

DeBardeleben (The) Coal and Iron Company, Bessemer, Jefferson county. Two stacks: Nos. 1 and 2, each 75 x 17, built in 1886-7; No. 1 put in blast in June, 1888, and No. 2 in April, 1889; seven Whitwell stoves; fuel, Alabama coke; ores, local brown hematite and red fossiliferous; product, foundry pig iron; total annual capacity, 80,000 net tons. Brand, "DeBardeleben." H. F. DeBardeleben, President; David Roberts, Vice-President; Andrew M. Adger, Secretary and Treasurer; L. W. Johns, Manager. Selling agents, George W. Stetson & Co., New York; Edmund D. Smith & Co., Philadelphia; Van Voorhis & Smith, Cincinnati.

Edwards Iron Company, Woodstock, Bibb county. One stack, 65 x 13½, first blown in June 10, 1880; remodeled in 1887; ore, local brown hematite; product, foundry and mill pig iron; annual capacity, 24,000 net tons. Giles Edwards, President; T. L. Gilmer, Secretary; T. J. Edwards, Superintendent.

Eureka Company, Oxmoor, Jefferson county. Two stacks: No. 1, 65 x 16, completed in July, 1877, and rebuilt and blown in in December, 1885; No. 2, 70 x 17, first blown in in March, 1876, and rebuilt and blown in in August, 1886; fuel, coke; ore, red fossiliferous; total annual capacity, 60,000 net tons. H. F. De Bardeleben, President; David Roberts, Secretary and Treasurer.

Fort Payne Furnace Company, Fort Payne, DeKalb county. Building one stack, 65 x 14; three Siemens-Cowper-Cochrane stoves; ores, red and brown hematite from company's mines near the furnace; fuel, coke made at the furnace from coal from mines on the property. Dr. J. M. Ford, President; C. O. Godfrey, Vice-President; S. C. Hathaway, Jr., Secretary and Treasurer; John H. Mullin, Superintendent.

Gadsden-Alabama Furnace, Gadsden-Alabama Furnace Company, Gadsden, Etowah county. One stack, 75 x 15, built in 1887-8, and first blown in October 14, 1888; closed top; three Whitwell stoves; fuel, Birmingham, Tracy City, and Pocahontas coke; ores, local red and brown hematite; product, foundry and mill pig iron; annual capacity, 37,000 net tons. Brand, "Etowah." Obal Christopher, President; John S. Paden, Vice-President; W. G. Brockway, Secretary;

- Richard B. Scott, Treasurer; John Downey, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; George H. Hull & Co., Louisville; Rogers, Brown & Meacham, St. Louis.
- Hattie Ensley Furnace, Enoch Ensley, Sheffield, Colbert county. One stack, 75 x 17, built in 1887-8; closed top; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite from Ensley mines at Russellville; product, foundry and neutral forge pig iron; annual capacity, 30,000 net tons. This furnace was built by the Sheffield Furnace Company, who operated it for three months, and then sold it to its present owner. Thomas D. Radcliffe, Secretary and Treasurer; Edward Doud, Superintendent.
- Lady Ensley Furnace, Lady Ensley Furnace Company, Sheffield, Colbert county. One stack, 75 x 17, built in 1887-9, and first blown in April 25, 1889; closed top; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite from Ensley mines at Russellville; product, foundry and neutral forge pig iron; annual capacity, 30,000 net tons. Enoch Ensley, President; Thomas D. Radcliffe, Secretary and Treasurer; Edward Doud, Superintendent. Selling agents, George H. Hull & Co., Louisville.
- Little Belle (The) Iron Company, Bessemer, Jefferson county. Building one stack, 60 x 12; three Whitwell stoves; fuel, coke; ores, red and brown hematite. H. F. De Bardeleben, President; M. E. Lopez, Vice-President; P. N. Simons, Secretary and Treasurer; D. H. Lopez, Superintendent. (May use charcoal fuel after first year.)
- Mary Pratt Furnace, Mary Pratt Furnace Company, Birmingham, Jefferson county. One stack, 65 x 14, built in 1882, and first put in blast in April, 1883; rebuilt in 1889; three Whitwell stoves; fuel, coke; ores, brown and red fossiliferous, mined within 8 miles of the furnace; annual capacity, 30,000 net tons. Brand, "Mary Pratt." W. T. Underwood, President; J. H. Edwards, General Manager; Z. L. Nabers, Secretary and Treasurer.
- North Alabama Furnace, Foundry, and Land Company, Florence, Lauderdale county. One stack, 75 x 16, completed in December, 1888, and blown in in October, 1889; three improved Pollock stoves; ore, Tennessee brown hematite; annual capacity, 30,000 net tons. James S. Lawton, President; J. H. Field, General Manager; Wade Allen, Secretary and Treasurer; A. J. McGarry, Superintendent.
- Pioneer Furnace, Pioneer Mining and Manufacturing Company, Thomas, Jefferson county. One completed stack and one stack building; No. 1, 75 x 17, built in 1886-8, and blown in May 15, 1888; four Siemens-Cowper-Cochrane stoves; fuel, Alabama coke; ores, red and brown hematite, from company's mines near the furnace; product, foundry pig iron; annual capacity, 43,000 net tons. Brand, "Pioneer." No. 2 furnace will be 75 x 17. Samuel Thomas, President, Catasauqua, Pa.; Edwin Thomas, Vice-President and Manager, Thomas, Ala.; George

H. Myers, Secretary and Treasurer, Bethlehem, Pa. Sole sales agents, Matthew Addy & Co., Cincinnati.

Sheffield and Birmingham Coal, Iron, and Railway Company, J. G. Chamberlain, Receiver, Sheffield, Colbert county. Three stacks, 75 x 18, built in 1887-8; one stack blown in in September, 1888, and one blown in in October, 1889; Gordon-Whitwell-Cowper stoves; fuel, Alabama coke; ore, Alabama and Tennessee brown hematite; product, foundry pig iron; estimated annual capacity, 120,000 net tons. H. B. Tompkins, general attorney for Receiver. Sole sales agents, Chamberlain, Wheeler & Co., Columbus, Ohio.

Sloss Furnaces, Sloss Iron and Steel Company, Birmingham, Jefferson county. Four stacks: No. 1, 65 x 16, built in 1881-2, and put in blast April 12, 1882; No. 2, 75 x 17, built in 1882; No. 3, 75 x 17, built in 1887-8, and blown in in October, 1888; No. 4, 75 x 17, built in 1887-9, and blown in in February, 1889; six Whitwell and eight Gordon-Whitwell-Cowper stoves; fuel, coke; ores and coal mined on the company's property within 10 to 15 miles of furnace; product, foundry and mill pig iron; total annual capacity, 140,000 net tons. Thomas Seddon, President; T. B. Lyons, Vice-President; W. H. Woodward, General Manager; J. P. Williams, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati; H. W. Adams & Co., New York.

Talladega Furnace, Talladega Iron and Steel Company Limited, Talladega, Talladega county. One stack, 72 x 18, built in 1889, and blown in October 5, 1889; three hot-blast stoves; fuel, Alabama and West Virginia coke; ore, local brown hematite; product, foundry and forge pig iron; annual capacity, 30,000 net tons.

Tennessee Coal, Iron, and Railroad Company, Nashville, Tennessee. Six stacks in Jefferson county, Alabama. Alice Furnaces at Birmingham; two stacks; No. 1, 63 x 15, built in 1879-80, and put in blast November 23, 1880; two Gordon-Whitwell-Cowper stoves; No. 2, 75 x 18, built in 1883, and put in blast July 24, 1883; three Whitwell stoves. Ensley Furnaces, at Ensley; four stacks, each 80 x 20, built in 1887, 1888, and 1889; No. 1 blown in March 19, 1889, No. 2, December 1, 1888, No. 3, June 5, 1888, and No. 4, April 9, 1888; four Gordon-Whitwell-Cowper stoves to each furnace. Fuel, coke, made in the company's ovens; ores, brown and red hematite and limonite, from the company's mines at Hillman and Redding; specialties, best grade of coke foundry and mill pig iron; annual capacity, of Alice Furnaces, 60,000 net tons, of Ensley Furnaces, 200,000 net tons. John Rice, Superintendent of Alice Furnaces; J. A. Stratton, Cashier of Birmingham Division; H. W. Hargreaves, Superintendent of Ensley Division. *See Furnaces in Tennessee for list of officers.*

Trussville Furnace, Birmingham Furnace and Manufacturing Company, Trussville, Jefferson county. One stack, 65 x 17½, built in 1887-9,

partly from material formerly composing Lemont Furnace in Fayette county, Pa.; first blown in in April, 1889; three Whitwell stoves; fuel, Alabama coke; ores, local red and brown hematite; product, foundry pig iron; annual capacity, 40,000 net tons. Robert Hogsett, President; J. K. Ewing, Treasurer; R. D. Smith, Secretary, Birmingham; Fuller Hogsett, General Manager, Trussville. Selling agents, Rogers, Brown & Co., Cincinnati; George H. Hull & Co., Louisville; Rogers, Brown & Meacham, St. Louis.

Williamson Furnace, Williamson Iron Company, Birmingham, Jefferson county. One stack, 65 x 13½, built in 1886, and first blown in in October, 1886; closed top; three Massick & Crook stoves; fuel, coke, made at Coalburg; ores, red fossil and brown hematite; product, foundry and mill pig iron; annual capacity, 15,000 net tons. Brand, "Williamson." C. P. Williamson, President and Manager; J. B. Simpson, Secretary and Treasurer; H. D. Williamson, Superintendent. Selling agents, Rogers, Brown & Co., Cincinnati; George S. Moore, Louisville.

W. B. Wood Furnace Company, Florence, Lauderdale county. Commenced in 1887 the erection of one stack, 75 x 18, but not yet completed. W. B. Wood, President; J. B. White, Secretary; C. D. Woodson, Treasurer; John M. Norton, Superintendent.

Woodstock Furnaces, Woodstock Iron Company, Anniston, Calhoun county. Two stacks, each 75 x 16, built in 1887-9, and one blown in October 10, 1889; six Whitwell stoves; fuel, Blockton (Ala.) coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 80,000 net tons. Brand, "Woodstock." A. L. Tyler, President; Walter Crafts, Vice-President and General Manager; F. M. Hight, Secretary and Treasurer. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & Co., Boston. *See Woodstock (charcoal) Furnaces.*

Woodward Iron Company, Woodward, Jefferson county. Telegraph address, Birmingham. Two stacks, each 75 x 17, one built in 1882-3, and put in blast in August, 1883, and the other built in 1886; seven Whitwell stoves; fuel, coke, made from the company's coal; ores, brown hematite, blackband, and red fossil, mined within three miles of the furnace; specialty, foundry pig iron; total annual capacity, 70,000 net tons. Brand, "Woodward." J. H. Woodward, President; Silas Hine, Secretary; Samuel Mathews, Treasurer.

Number of coke furnaces in Alabama: 32 completed stacks, and 6 stacks building.

CHARCOAL.

Attalla Furnace, Attalla Furnace Company, Attalla, Etowah county. 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, 15,000 net tons. Brand, "Attalla." L. S. Colyar, President, Treasurer, and Man-

ager; D. J. O'Connell, Vice-President; D. W. Hughes, Secretary. Selling agents, Rogers, Brown & Co., Cincinnati.

Clifton Furnaces, Clifton Iron Company, Ironaton, Talladega county. One completed stack and one stack building. No. 1 furnace, 55 x 12½, completed and first blown in April 16, 1885; hot blast; ore, local brown hematite; product, strictly neutral car-wheel pig iron; annual capacity, 13,000 net tons. Brand, "Clifton." The furnace that is building will be 56 x 13½, and will have an annual capacity of 20,000 net tons. Frederick Prime, President, Philadelphia; A. L. Tyler, Vice-President; John S. Mooring, Secretary and Treasurer, and Stephen N. Noble, Superintendent, Ironaton. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & Co., Boston.

Decatur Charcoal Iron Furnace, Decatur Land, Improvement, and Furnace Company, New Decatur, Morgan county. One stack, 60 x 12, built in 1887-8, and completed in the spring of 1888; two Gordon-Whitwell-Cowper stoves; estimated annual capacity, 18,000 net tons. The furnace has not yet been blown in, and is for sale or lease. C. C. Harris, President; Breck. Jones, Vice-President and Business Manager; J. H. Dowland, Secretary; W. W. Hedges, Treasurer.

Gadsden Furnace, Gadsden Iron Company, Gadsden, Etowah county. One stack, 64 x 12, built in 1882 with material formerly composing the Vigo Iron Company's No. 1 furnace at Terre Haute, Ind.; first blown in May 30, 1883; hot blast; ores, local hard and brown hematite; product, foundry and car-wheel pig iron; annual capacity, 9,000 net tons. Brand, "Gadsden." Formerly called Coosa Furnace. A. J. Crawford, President, Terre Haute, Indiana; T. W. Stewart, Secretary, Treasurer, and General Manager. Selling agents, George H. Hull & Co. and Hall Brothers & Co. Louisville; Bacon, Floto & Co., Cincinnati.

Jenifer Furnace, Jenifer Iron Company, Jenifer, Talladega county. One stack, 55 x 9¾, built in 1873; remodeled in 1884; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 10,000 net tons. Formerly owned by the Clifton Iron Company. John W. Noble, President, and George Noble, General Manager, Anniston; George A. Noble, Secretary and Treasurer, and A. E. Noble, Superintendent, Jenifer. Selling agents, Warren Wood & Co., New York.

Langdon Furnace, Langdon Iron Company, Langdon, Cherokee county. Rebuilding Stonewall Furnace, built in 1873, and abandoned in 1885; new stack to be 46 x 11; annual capacity, 13,500 net tons.

Rock Run Furnace, Bass Furnace Company, Rock Run, Cherokee county. One stack, 47 x 9, built in 1873-4, and enlarged in 1881; warm blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "Rock Run." J. H. Bass, President, A. D. Guild, Secretary, and J. I. White, Treasurer, all at Fort Wayne, Ind.; R. H. McConaughy, Superintendent.

Round Mountain Iron Works, The Elliott Pig Iron Company, Gadsden. Furnace at Round Mountain, Cherokee county. One stack, 45 x 9½, built in 1853, rebuilt in 1874, and remodeled in 1888; cold blast; ore, red fossiliferous; specialty, car-wheel pig iron; annual capacity, 7,000 net tons. Brand, "Round Mountain." J. M. Elliott, President, Round Mountain; J. M. Elliott, Jr., Treasurer and General Manager, Gadsden. Selling agents, Rogers, Brown & Co., Cincinnati.

Shelby Furnaces, Shelby Iron Company, Shelby, Shelby county. Two stacks, each 60 x 14, built in 1863 and 1873; warm blast; ore, brown hematite, obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 25,000 net tons. Brand, "Shelby." Ward W. Jacobs, President, Newton Case, Treasurer, and W. A. Willard, Secretary, Hartford, Conn.; H. R. Stoughton, Vice-President and General Manager, Shelby. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Pierson & Co., Boston.

Tecumseh Furnace, Tecumseh Iron Company, Tecumseh, Cherokee county. One stack, 60 x 12, built in 1873, and put in blast February 19, 1874; hot blast; ore, local brown hematite; product, foundry, mill, and car-wheel irons; annual capacity, 15,000 net tons. Brand, "Tecumseh." Willard Warner, President and General Manager; Willard Warner, Jr., Secretary and Treasurer; Charles B. Parker, Superintendent. Selling agents, Matthew Addy & Co., Cincinnati.

Woodstock Furnaces, Woodstock Iron Company, Anniston, Calhoun county. Two stacks, each 50 x 12; No. 1 first blown in April 13, 1873, rebuilt in 1880; No. 2 first blown in August 27, 1879; hot and cold blast; ore, local brown hematite; product, car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Woodstock." *See Woodstock (coke) Furnaces for list of officers.*

Number of charcoal furnaces in Alabama: 12 completed stacks, and 2 stacks building. Total number of furnaces in Alabama: 44 completed stacks, and 8 stacks building.

CONTEMPLATED.

Blue Mountain Iron Company, Jacksonville, Calhoun county, contemplates erecting two charcoal furnaces.

Vanderbilt Steel and Iron Company contemplates erecting a coke furnace near Birmingham, Jefferson county. George O. Vanderbilt, President, Princeton, New Jersey.

TEXAS.

CHARCOAL.

Lone Star Iron Company, Jefferson, Marion county. Main office, 87 Washington st., Chicago, Ill. Building one stack, 60 x 12; closed top; two Durham iron stoves; ores, local hematite and limonite;

product, car-wheel pig iron; annual capacity, 18,000 net tons. John A. Kruse, President; Edward Atfield, Secretary.

Tassie Belle Furnace, New Birmingham Iron and Land Company, New Birmingham, Cherokee county. New York office, 47 Broadway. Building one stack, 60 x 11, to be completed early in 1890; estimated annual capacity, 16,000 net tons. H. H. Wibirt, President and Treasurer, New York; R. L. Coleman, 1st Vice-President, St. Louis; A. B. Blevins, 2d Vice-President and General Manager, and David Carson, Superintendent, New Birmingham.

Old Alcalde Furnace, State of Texas, owner; W. G. Parish, Financial Agent, Rusk, Cherokee county. One stack, 55 x 9½, built in 1883, and put in blast February 27, 1884; hot blast; ore, brown hematite, mined near the furnace; product, car-wheel and foundry pig iron; annual capacity, 8,000 net tons. Brand, "Old Alcalde." A pipe foundry is connected with the works, and melted iron is run directly from the furnace into water pipe of all sizes. R. A. Barrett, Manager.

Number of furnaces in Texas: one completed charcoal stack, and 2 stacks building.

OHIO.

HANGING ROCK—CHARCOAL.

Bloom Furnace, Clare Iron Company, Bloom Switch, Scioto county. Telegraph address, Webster. One stack, 33 x 11, built in 1832, and rebuilt in 1846; burned December 7, 1887, and rebuilt in the spring of 1888; hot blast; open top; ore, hematite; product, No. 1 foundry pig iron; annual capacity, 3,000 net tons. Brand, "Bloom." E. H. Clare, Secretary; F. H. Miller, Manager.

Buckeye Furnace, F. E. Hinckley, Chicago, Ill. Furnace at Riverton, Jackson county. One stack, 40 x 10, built in 1851; open top; hot blast; ore, red limestone, mined on the property; specialty, No. 1 and No. 2 foundry pig iron; annual capacity, 4,000 net tons. Idle. *See Milton Furnace, Hanging Rock Bituminous region. See Rolling Mills.*

Centre Furnace, Centre Mining and Manufacturing Company, Ironton, Lawrence county. One stack, 40 x 10½, built in 1837; cold and warm blast; open top; ore, native limestone; product, car-wheel and extra strong machinery iron; annual capacity, 5,000 net tons. (Grant Furnace, built in 1869, has been abandoned.) W. D. Kelly, President; Lindsey Kelly, Vice-President and General Manager; O. Richey, Secretary; Joshua Austin, Treasurer.

Hecla Furnace, Hecla Iron and Mining Company, Ironton, Lawrence county. One stone stack, 36 x 10½, built in 1833; cold blast; open top; ores, local siderite and limonite, calcined in two ovens, with wood, after being crushed; product, car-wheel and machinery pig iron; annual capacity, 3,100 net tons. Stopped on Sundays. Brand, "Hecla." Commenced in 1887 the erection of an iron stack, 52 x

10½, to be completed in 1890, when it will be operated by George N. Gray & Co. John Campbell, President; Henry S. Neal, Vice-President; Charles Campbell, Secretary and Treasurer; Isaac N. Henry, Superintendent. Sales agents, James Collord, Pittsburgh; Wolf & Good, St. Louis; George S. Moore, Louisville; Bacon, Floto & Co., Cincinnati.

Jefferson Furnace, Jefferson Furnace Company, Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854; open top; cold blast; ore, local limestone; product, pig iron suitable for car-wheels and machinery; annual capacity, 3,000 net tons. Joseph J. Jones, Secretary; Eben J. Jones, Treasurer; J. D. Davis, Superintendent. Selling agents, Chamberlain, Wheeler & Co., Columbus; James Collord, Pittsburgh.

Madison Furnace, Clare, Duduit & Co., Rempel, Jackson county. One stack, 37 x 9½, built in 1854; hot blast; open top; ore, native red limestone; product, No. 1 foundry pig iron; annual capacity, 3,500 net tons. Brand, "Madison." J. D. Clare, Agent; Linn Bentley, General Superintendent. Selling agents, Chamberlain, Wheeler & Co., Columbus.

Mount Vernon Furnace, The Campbell Iron Company, Campbell, Lawrence county. Telegraph address, Mount Vernon Furnace. One stack, 32 x 10, built in 1833; open top; ore, native hematite; product, warm-blast car-wheel iron; annual capacity, 3,500 net tons. Brand, "Mt. Vernon." J. H. Moulton, President, Ironton; J. W. Campbell, Manager, at the furnace.

Olive and Buckhorn Furnaces, McGugin & Co., Olive Furnace P. O., Lawrence county. Furnaces situated on the Dayton, Fort Wayne, and Chicago Railroad. Telegraph address, Ironton. Two stacks. Olive Furnace, 37 x 9½, built in 1846. Buckhorn Furnace, 38 x 10, built in 1833, and rebuilt in 1852. Native limestone ore is used in both furnaces; both have open tops; hot and warm blast; product, foundry and car-wheel pig iron; total annual capacity, 8,000 net tons. Brands, "Buckhorn" and "Olive." W. H. McGugin, Superintendent. Selling agents, Hosford & Fischer, Cincinnati.

Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 34 x 11, built in 1827, and rebuilt in 1844; open top; hot blast; limestone ore; product, strong foundry pig iron; annual capacity, 5,500 net tons. Brand, "Pine Grove." E. B. Willard, President; James Bull, Secretary and Treasurer; A. R. Mackintosh, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; James Collord, Pittsburgh; George S. Moore, Louisville. *See Hanging Rock Bituminous Furnaces.*

Scioto Furnace, Crawford & Leonard, Scioto Furnace, Scioto county. One stack, 32 x 10½, built in 1844; open top; hot blast; annual capacity, 4,000 net tons. Selling agents, Bacon, Floto & Co., Cincinnati.

Vesuvius Furnace, Etna Iron Works, A. Pluemer, Receiver, Fifth and Vine sts., Cincinnati. Furnace at Pedro, Lawrence county. One

stack, 32 x 10, built in 1832, rebuilt in 1886; cold blast; open top; ore, native limestone; product, car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Vesuvius." Selling agents, Hosford & Fischer, Cincinnati. *See Hanging Rock Bituminous Furnaces.*

Total number of charcoal furnaces in Hanging Rock region of Ohio: 12 completed stacks, and one stack building. The Hanging Rock charcoal furnaces generally stop on Sunday, as do also some of the bituminous furnaces in this region.

HANGING ROCK—BITUMINOUS COAL OR COKE.

Belfont Furnace, Belfont Iron Works Company, Ironton, Lawrence county. One stack, 66 x 16, built in 1868; fuel, coke and coal; ores, Lake Superior, Missouri, Virginia, and native; product, foundry and forge pig iron; annual capacity, 18,000 net tons. *See Rolling Mills.*

Eliza Furnace, Wellston, Jackson county. One stack, 52 x 13, built in 1877 of material from the abandoned Ophir Furnace, and blown in October 30, 1877; rebuilt in 1881, and remodeled in 1884; fuel, raw coal and coke; limestone ore; annual capacity, 8,000 net tons. H. S. Willard and H. S. Bundy, Receivers. Idle and for sale.

Etna Iron Works, A. Pluemer, Receiver, Fifth and Vine sts., Cincinnati. Furnaces at Ironton, Lawrence county. Two stacks: Alice Furnace, 86 x 18, first blown in September 13, 1875; and Blanche, (alternate stack,) 86 x 18, first blown in in 1888; four Whitwell stoves; fuel, New River coke; ores, Hanging Rock, Lake Superior, Virginia, and Kentucky; product, mostly foundry pig iron; annual capacity, 30,000 net tons. Machinery is sufficient for operating only one furnace at a time. Selling agents, Hosford & Fischer, Cincinnati. *See Hanging Rock Charcoal Furnaces.*

Globe Iron Company, Jackson, Jackson county. Two stacks. Fulton Furnace, 50 x 13½, built in 1868, and rebuilt in 1886-7; product, high silicon softeners. Brand, "Globe Silicon." Huron Furnace, 49 x 13, first blown in April 19, 1875, and rebuilt in 1889; product, foundry pig iron. Fuel, ¾ raw coal and ¼ coke; ore, native; total annual capacity, 13,500 net tons. Eben Jones, President; E. Crandall, General Superintendent; L. T. Murfin, Manager; J. E. Jones, Secretary.

Hamilton Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 65 x 16, built in 1883, and first blown in in March, 1886; three Whitwell stoves; fuel, Kanawha and Connellsville coke and raw coal; ores, native block and limestone; product, soft foundry pig iron; annual capacity, 20,000 net tons. Brand, "Hamilton." *See Hanging Rock Charcoal Furnaces for list of officers.*

Ironton Furnace, Ironton Furnace Company, lessee, Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; fuel, bituminous coal and West Virginia coke; ores, Hanging Rock limestone and Lake Superior hematite; product, foundry pig iron and neutral gray forge for special

- bars and chains; annual capacity, 15,000 net tons. Brand, "Ironton." E. J. Bird, Jr., President and Treasurer; E. J. Bird, Manager.
- Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. Main office, Ironton. Building one stack, 65 x 14, to use machinery removed from Waldorf Furnace, W. Va.; fuel, coke; annual capacity, 12,000 net tons. James F. Peters, General Manager.
- Milton Furnace, F. E. Hinckley, Chicago, Ill. Furnace at Wellston, Jackson county. One stack, 60 x 14, built in 1873-4, put in blast June 6, 1874; Whitwell stoves; fuel, raw coal; ore, Hanging Rock limestone; product, soft, open-grained foundry pig iron, known as "American Scotch;" annual capacity, 9,000 net tons. Idle. *See Buckeye Furnace, Hanging Rock Charcoal region. See Rolling Mills.*
- Sarah Furnace, A. Pluemer, Receiver, Cincinnati. Furnace at Ironton, Lawrence county. One stack, 60 x 14, built in 1877, blown in March 18, 1878, and remodeled in 1886; three Whitwell stoves; fuel, New River (W. Va.) coke; ores, native, Virginia, Lake Superior, and Kentucky; product, No. 1 foundry pig iron; annual capacity, 12,000 net tons. Brand, "Sarah." Selling agents, Hosford & Fischer, Cincinnati.
- Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, 54 x 14, built in 1866, and rebuilt in 1879; fuel, $\frac{3}{4}$ native raw coal and $\frac{1}{4}$ West Virginia coke; ores, native limonite and block; product, Nos. 1 and 2 silver gray foundry and gray mill irons; annual capacity, 9,000 net tons. James Chesnut, President; B. Kahn, Secretary; L. V. Brown, Manager. Selling agents, Matthew Addy & Co., Cincinnati; Tod, Stambaugh & Co., Cleveland.
- Tropic Furnace, Tropic Iron Company, Jackson, Jackson county. One stack, 47 x 13, built in 1872-3, and rebuilt in 1879; hot blast; fuel, raw coal; ores, native limestone and block; product, foundry pig iron; annual capacity, 7,000 net tons. H. L. Chapman, President; J. C. Jones, Secretary and Treasurer; Miles Jones, Superintendent.
- Wellston Furnace, Wellston Furnace Company, Wellston, Jackson county. Two stacks: No. 1, 52 x 13, built in 1874-5, and remodeled in 1879 and 1889; No. 2, 55 x 14, built in 1874-5, and remodeled in 1889; local limestone ore; product, neutral foundry pig iron; annual capacity, 17,000 net tons. E. A. Hyde, President; Robert Vierling, Vice-President; J. F. Forsyth, Secretary and Treasurer; J. C. Clutts, General Manager; T. J. Morgan, Auditor. Selling agents, Forsyth, Hyde & Co., Chicago.
- Number of bituminous furnaces in Hanging Rock region of Ohio: 14 completed stacks, and one stack building.

MAHONING VALLEY—BITUMINOUS COAL OR COKE.

- Anna Furnace, Struthers Furnace Company, lessee, Struthers, Mahoning county. One stack, 75 x 16, built in 1869, rebuilt in 1881; fuel, Connellsville coke; ore, Lake Superior; specialty, strong neutral foundry

dry pig iron; annual capacity, 40,000 net tons. Brand, "Struthers." James Pickands, President, Cleveland; Myron C. Wick, Vice-President, Youngstown; Robert Bentley, Secretary, Treasurer, and General Manager, Lowellville. Selling agents, Pickands, Brown & Co., Chicago, and Pickands, Mather & Co., Cleveland.

Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Three stacks. Tod Furnace No. 1, 66 $\frac{1}{2}$ x 14, built in 1846, and rebuilt in 1879; Tod Furnace No. 2, 70 x 16, built in 1889, with machinery formerly at Eagle Furnace, at Youngstown; product, foundry pig iron. Grace Furnace No. 1, 80 x 18, built in 1861, torn down in 1873, and rebuilt in 1882; specialty, Bessemer pig iron. Fuel, coke; ores, Lake Superior and blackband; total annual capacity, 100,000 net tons. Brands, "Brier Hill" and "Grace." The company is furnishing all the furnaces with Massick & Crook stoves. George Tod, President; Henry Tod, Vice-President; J. G. Butler, Jr., General Manager; H. H. Stambaugh, Secretary and Treasurer.

Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Two stacks: Falcon Furnace, 55 x 12 $\frac{3}{4}$, built about 1850; Phoenix Furnace, 60 x 15, built in 1854; ore, Lake Superior; fuel, Connellsville coke; product, forge pig iron; total annual capacity, 62,000 net tons. Brand, "Mahoning." *See Rolling Mills.*

Girard Furnace, Girard Iron Company, Girard, Trumbull county. One stack, 75 x 16, built in 1866, remodeled in 1879, and stack raised in 1884; fuel, Connellsville coke exclusively; ore, Lake Superior; product, mill pig iron; annual capacity, 60,000 net tons. Brand, "Girard." Adding two improved Pollock stoves, which will increase the annual capacity to 75,000 net tons. A. M. Byers, sole owner, Pittsburgh; Henry B. Shields, Manager, Girard.

Hannah Furnace, Mahoning Valley Iron Company, Youngstown. One stack, 75 x 16, first put in blast June 14, 1880; rebuilt in 1888; fuel, Connellsville coke; ore, Lake Superior; product, mill pig iron, all used in the company's rolling mill; annual capacity, 56,000 net tons. Thomas H. Pollock, Manager. *See Rolling Mills.*

Haselton Iron Works, The Andrews Brothers Company, Haselton, Mahoning county. Branch office at Youngstown. One stack, 75 x 18, built in 1867, and rebuilt in 1880; fuel, coke; product, Bessemer, foundry, and mill pig iron from Lake Superior ores, and "American Scotch" pig iron from a blackband ore obtained at Mineral Ridge, 12 miles from the furnace; annual capacity, 50,000 net tons. Brand, "Haselton." *See Rolling Mills.*

Himrod Furnaces, S. Frank Eagle, lessee, Youngstown, Mahoning county. Two stacks, 70 x 15 and 70 x 16, built in 1859 and 1860, and rebuilt in 1876; fuel, coke; ore, Lake Superior; product, foundry and mill pig iron; total annual capacity, 65,000 net tons.

Hubbard Furnaces, Andrews & Hitchcock, Youngstown, Mahoning

county. Works at Hubbard, Trumbull county. Two stacks, 75 x 16 and 77 x 17, built in 1867 and 1872; one rebuilt in 1883, and the other rebuilt in 1886; fuel, Connellsville coke; product, mainly foundry pig iron. "Hubbard strong foundry" is made from a mixture of Lake Superior specular and magnetic ores. "Hubbard Scotch" is from $\frac{3}{4}$ Trumbull county blackband and $\frac{1}{4}$ Lake Superior ore, and sells in place of Scotch pig iron. Total annual capacity, 73,000 net tons.

Mary Furnace, Ohio Iron and Steel Company, Lowellville, Mahoning county. One stack, 75 x 16, built in 1845, rebuilt in 1872, and completely remodeled in 1883; fuel, Connellsville coke; ores, Lake Superior and native blackband; product, strong neutral foundry pig iron; annual capacity, 45,000 net tons. Specialty, Ohio blackband Scotch. Brands, "The Mary" for Lake ore iron and "Ohio Scotch" for blackband mix. Formerly called Ada Furnace. Thomas H. Wells, President; John C. Wick, Vice-President; Robert Bentley, Secretary, Treasurer, and General Manager. Selling agents, Pickands, Brown & Co., Chicago; Pickands, Mather & Co., Cleveland; N. S. Bartlett & Co., Boston.

Thomas Furnace, Thomas Furnace Company, Niles, Trumbull county. One stack, 71 x 16, built in 1870, and enlarged in 1883; three fire-brick stoves; fuel, Connellsville coke; ores, Mineral Ridge blackband, mined $2\frac{1}{2}$ miles from the furnace, and Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 50,000 net tons. Brand, "Niles Scotch" for soft foundry. J. R. Thomas, Manager.

Number of bituminous furnaces in the Mahoning Valley: 15 stacks.

HOCKING VALLEY—BITUMINOUS COAL OR COKE.

Baird Furnace, Baird Furnace Company, Gore, Hocking county. Furnace in Perry county. Telegraph address, Baird Furnace. One stack, 54 x 12 $\frac{1}{2}$, built in 1874-5, and blown in October 9, 1875; rebuilt in 1886; fuel, raw semi-bituminous coal; ore, native limestone; product, strong No. 1 foundry pig iron; annual capacity, 8,000 net tons. Brand, "Baird." F. B. Baird, President; C. R. Baird, Treasurer; F. B. McElhuinie, Secretary. Selling agents, Chamberlain, Wheeler & Co., Columbus, St. Louis, and Chicago.

Columbus and Hocking Coal and Iron Company, Columbus. Four stacks. Akron Furnace, at Buchtel, Athens county, one stack, 60 x 16, built at Akron in 1872, removed to Buchtel in 1877, and blown in November 30, 1877. Bessie Furnace, at New Straitsville, Perry county, one stack, 60 x 14, built in 1877-8, and blown in January 21, 1878; four Whitwell stoves; contemplate enlarging the stack to 70 x 16. Gore Furnace, at Gore, Hocking county, one stack, 60 x 13, built in 1876, blown in December 8, 1876. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12 $\frac{1}{2}$, completed and blown in February 20, 1878; three Whitwell stoves. Fuel, raw bituminous

- coal, obtained from the company's mines near the furnaces; ores, native and Lake Superior; product, foundry pig iron; total annual capacity, 80,000 net tons. (Greendale Furnace is also owned by this company, but is now leased to the Greendale Furnace Company.) Jay O. Moss, President; H. D. Turney, 1st Vice-President; V. Ferguson, 2d Vice-President; Walter Crafts, Treasurer; F. W. Merrick, Secretary. Sole sales agents, Chamberlain, Wheeler & Co., Columbus.
- Fannie Furnaces, J. C. Hamilton, Trustee, Shawnee, Perry county. Two stacks: No. 1, 47 x 11½, built in 1874-5 at Newark, removed to Shawnee in 1876, and blown in September 15, 1876; No. 2, 65 x 15, first put in blast October 10, 1877; extensive improvements made in 1884 and 1886; fuel, raw bituminous coal; ore, Lake Superior; product, American Scotch foundry pig iron; total annual capacity, 20,000 net tons. Brands, "Iron Point Scotch" and "Hattie." Jacob H. Opperman, Superintendent; W. L. Rous, Bookkeeper.
- Glasgow Furnace, King, Gilbert & Warner, Columbus. Furnace at Moxahala, Perry county. One stack, 70 x 16½, built in 1877-8, and rebuilt in 1887; fuel, coke; ore, blackband; product, "Glasgow American Scotch" pig iron; annual capacity, 40,000 net tons. W. S. Church, Superintendent. *See Franklin Furnace, Miscellaneous Bituminous. See Rolling Mills.*
- Greendale Furnace, Greendale Furnace Company, lessee, Greendale, Hocking county. One stack, 58 x 15, first put in blast November 8, 1879; its machinery was formerly used at Kenton Furnace, at Newport, Ky., built in 1869, and dismantled in 1877; fuel, bituminous coal; ore, native and Lake Superior; product, foundry pig iron; annual capacity, 15,000 net tons. Also called Crafts Furnace. J. A. Long, President; D. F. Schaff, Secretary and Treasurer; C. H. Boardman, Superintendent.
- New York Furnace, New York and Perry Coal and Iron Company, Shawnee, Perry county. Two stacks: one 50 x 14½, built in 1877, and blown in November 10, 1877; the other, 65 x 15, built in 1887, and blown in December 15, 1887, with two Gordon-Whitwell-Cowper stoves; fuel, raw coal; ores, native, from the company's property, and Lake Superior; product, No. 1 foundry pig iron; total annual capacity, 50,000 net tons. George A. Blood, President and General Manager; S. Wm. Blood, Secretary; F. P. Perkins, Treasurer.
- Ohio and Western Coal and Iron Company, James A. Hall, Receiver, Rooms 49 and 50, Wesley Block, Columbus. Four stacks: Helen Furnace, at Orbiston, Hocking county, one stack, 52 x 15, built in 1877, and first blown in in December, 1877. XX Furnace, at Shawnee, Perry county, one stack, 50 x 14, built in 1876-7, and first blown in January 18, 1877. A and B Furnaces, at Floodwood, Athens county, two stacks, each 75 x 17, completed in 1888. Fuel, mainly raw coal, mixed with some coke; ores, native limestone, with some Lake

Superior; product, chiefly foundry pig iron. (Lee Furnace, at Monday, Hocking county, built in 1877-8, was dismantled in 1888.) Number of bituminous furnaces in the Hocking Valley: 15 stacks.

MISCELLANEOUS—BITUMINOUS COAL OR COKE.

- Bellaire Nail Works, Bellaire, Belmont county. One stack, 75 x 16, built in 1873, blown in September 22, 1873, and rebuilt in 1886; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron, consumed in the manufacture of steel for nails; annual capacity, 50,000 net tons. *See Rolling Mills.*
- Benwood Iron Works, Wheeling, West Virginia. Furnace at Martin's Ferry, Belmont county, Ohio. One stack, 60 x 14, built in 1866; iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 28,000 net tons. *See Rolling Mills in West Virginia.*
- Cherry Valley Furnaces, Cherry Valley Iron Works, Leetonia, Columbiana county. Two stacks: No. 1, 55 x 14, built in 1867; and No. 2, 75 x 16, built in 1868, and rebuilt in 1883; fuel, coke and raw coal; ores, native and Lake Superior mixed; specialty, "American Scotch" foundry pig iron; total annual capacity, 33,000 net tons. Brand, "Cherry Valley." Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Rolling Mills.*
- Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Three stacks. Central Furnaces, two stacks: one, 75 x 20, built in 1881-2, three Whitwell stoves; and one, 80 x 20, built in 1887, four fire-brick stoves. Newburgh Furnace, 65 x 16, built in 1872, and remodeled in 1886. Fuel, coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; total annual capacity, 180,000 net tons. *See Rolling Mills.*
- Dover Furnace, Penn Iron and Coal Company, Canal Dover, Tuscarawas county. One stack, 66 x 15, built in 1854, rebuilt in 1878-9; fuel, raw coal and Connellsville coke; ores, blackband, with a mixture of Lake Superior; product, foundry pig iron; annual capacity, 30,000 net tons. Brand, "Tuscarawas." J. P. Burton, President, Massillon, Ohio; S. W. Croxton, Treasurer and General Manager, Cleveland; O. H. S. Ream, Secretary, Canal Dover.
- Emma Furnace, Union Rolling Mill Company, Cleveland, Cuyahoga county. One stack, 80 x 18, built in 1872, and remodeled in 1882-3; new Ford & Moncur hot-blast stoves added in 1889; fuel, Connellsville coke; ore, Lake Superior; product, foundry and forge pig iron; annual capacity, 55,000 net tons. Brand "Emma." S. A. Fuller, General Manager. Selling agents, Condit, Fuller & Co., Cleveland. *See Rolling Mills.*
- Franklin Furnace, King, Gilbert & Warner, lessees, Columbus, Franklin county. One stack, 64 x 16, completed in November, 1873; rebuilt in 1884 and 1886; fuel, coke; ores, Hanging Rock limestone and Lake

Superior; product, strong foundry pig iron; annual capacity, 35,000 net tons. Brand, "Franklin." *See Glasgow Furnace, Hocking Valley. See Rolling Mills.*

Jefferson Iron Works, Steubenville, Jefferson county. Two stacks: No. 1, 58 x 14½, built in 1863, and rebuilt in 1877 and 1886; three Gordon-Whitwell-Cowper stoves; No. 2, 80 x 18, built in 1865, and rebuilt in 1889; Whitwell stoves; only one stack operated at a time; fuel, Connellsville coke; ores, Missouri and Lake Superior; specialty, Bessemer pig iron; annual capacity, 60,000 net tons. Propose tearing down No. 1 and remodeling it. Brand, "Jefferson." Pig iron sold by Jefferson Iron Works, and by Nimick & Co. and John B. Herron, Pittsburgh. *See Rolling Mills.*

Mingo Furnaces, Junction Iron Company, Wheeling, W. Va. Furnaces at Mingo Junction, Jefferson county. Two stacks: No. 1, called Lucy L. Furnace, 75 x 18, built in 1871, rebuilt in 1886; No. 2, called Stella Furnace, 75 x 17, built in 1872, first put in blast in May, 1873, and rebuilt in 1886 with fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 75,000 net tons. George A. Dean, Foundryman. *See Rolling Mills.*

Proton Furnaces, Cleveland Iron Company, Cleveland, Cuyahoga county. Two stacks: one 60 x 16, built in 1869, and rebuilt in 1878; the other stack, 70 x 17, built in 1879, and blown in October 15, 1879; iron stoves. Formerly leased by the Cleveland Rolling Mill Company. W. Bingham, President; James Barnett, Vice-President; S. A. Fuller, Secretary and Treasurer. Idle; both need remodeling.

Seneca Furnaces, McKeefrey & Hofius, Leetonia, Columbiana county. Furnaces at Graffton. Two stacks, 53 x 13 and 53 x 14, built in 1866 and 1872; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron. Formerly called Graffton Furnaces.

Steubenville Furnace, Riverside Iron Works, Wheeling, W. Va. Furnace at Steubenville, Jefferson county. One stack, 75 x 15, built in 1872, blown in in December, 1872, and rebuilt in 1886; fuel, Connellsville coke; ores, Missouri, Lake Superior, and foreign; product, Bessemer pig iron; annual capacity, 45,000 net tons. Brand, "Riverside." *See Furnaces and Rolling Mills in West Virginia.*

Zanesville Furnace, Ohio Iron Company, Zanesville, Muskingum county. One stack, 75 x 15½, built in 1870-1, blown in September 7, 1871, and rebuilt in 1883; three Whitwell stoves, each 65 x 17; fuel, Connellsville coke; ores, Lake Superior and Missouri; product, forge, Bessemer, and foundry pig iron; annual capacity, 37,000 net tons. *See Rolling Mills.*

Number of bituminous coal or coke furnaces in Ohio outside of the Hanging Rock, Mahoning Valley, and Hocking Valley districts: 20 stacks. Total number of furnaces in Ohio: 76 completed stacks, and 2 stacks building.

INDIANA.

BITUMINOUS BLOCK COAL.

Brazil Furnace, Central Iron and Steel Company, Brazil, Clay county. One stack, 60 x 13, built in 1867, blown in in December, 1867, and remodeled in 1872; fuel, raw block coal; ores, Lake Superior and Iron Mountain; specialty, forge pig iron; annual capacity, 10,000 net tons. Brand, "Brazil." Major Collins, President and Manager; Charles Minshall, Secretary and Treasurer. *See Rolling Mills.*

Vigo Furnace, Vigo Iron Company, Terre Haute, Vigo county. One stack, 62½ x 13, built in 1872, and blown in in 1873; rebuilt in 1889; fuel, raw coal; ore, Missouri; specialty, forge pig iron; annual capacity, 20,000 net tons. Brand, "Vigo." (The No. 1 furnace, built in 1869, was torn down in 1882 and removed to Alabama.) A. J. Crawford, President; J. P. Crawford, Secretary and Treasurer.

Number of furnaces in Indiana: 2 bituminous stacks.

ILLINOIS.

COKE.

Big Muddy Furnace, Grand Tower, Jackson county. One stack, 69 x 17, built in 1871; weekly capacity, 315 net tons. Owned by the creditors of the Lewis Iron Company.

Calumet Furnace, Chicago Furnace Company, lessee, Chicago. Works at Cummings, Cook county. One stack, 75 x 18, built in 1880; one Massick & Crook and three Siemens-Cowper-Cochrane stoves; fuel, Connellsville coke; ores, Lake Superior and Menominee; product, foundry and mill pig iron; annual capacity, 50,000 net tons. Brand, "Calumet." Charles Himrod, Vice-President and General Manager. Sales agents, Charles Himrod & Co., Chicago and Detroit. Owned by the Calumet Iron and Steel Company, Rookery Building, Chicago.

Illinois Steel Company, Rookery Building, Chicago, Cook county. Twelve completed stacks and one stack building in Illinois. North Works, located at Chicago, on north branch of Chicago river, at the foot of Waubansia avenue, have two stacks, (Nos. 1 and 2,) each 66 x 17, built in 1869; three Player iron stoves and three fire-brick stoves; annual capacity, 80,000 net tons. South Works, located at South Chicago, have four stacks, (Nos. 5, 6, 7, and 8,) each 75 x 21, built in 1880-1, two of which were put in blast in 1881 and two were put in blast in 1882; twelve fire-brick stoves; annual capacity, 287,000 net tons. Joliet Works, located at Joliet, Will county, have two completed stacks and one stack building; No. 1 and No. 2, each 80 x 20, built in 1873; No. 1 first put in blast in June, 1880, and No. 2 first put in blast in January, 1882; three Gordon-Whitwell-Cowper and three Siemens-Cowper-Cochrane stoves; annual capacity, 160,000 net tons; No. 3, building, to be 80 x 20, and to be completed in March, 1890;

four Massick and Crook stoves. Union Works, located at Chicago, have four stacks, two, each 72 x 13, built in 1869, and rebuilt in 1885, and two, each 74 x 16, built in 1881 and 1882; two Cowper and eight Whitwell stoves; annual capacity, 200,000 net tons. Fuel used by all these furnaces, Connellsville coke; ore, Lake Superior; specialty, Bessemer pig iron. *See Furnaces in Wisconsin. See Rolling Mills in Illinois and Wisconsin.*

Meier Furnaces, Meier Iron Company, 707 Bank of Commerce Building, St. Louis. Furnaces at Bessemer Station, near East Carondelet, St. Clair county. Two stacks, each 60 x 17, built in 1873-5, but blown in for the first time in 1880; eight Whitwell hot-blast stoves; fuel, coke; ore, Missouri specular and hematite; total annual capacity, 56,000 net tons. Theodore G. Meier, President; E. D. Meier, Secretary; John W. Meier, Treasurer. Sold under mortgage in 1888 to George L. Allen, representing bondholders, but may be redeemed by stockholders. Number of furnaces in Illinois: 16 completed bituminous stacks, and one stack building.

MICHIGAN.

CHARCOAL.

Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. Two stacks: one, 48 x 8½, first put in blast December 25, 1882; burned May 29, 1883, and rebuilt; the other, 48 x 10, built in 1887-8, and blown in in April, 1888; hot blast; charcoal supplied by 54 round brick kilns, of an average capacity of 75 cords; wood cut from company's land; ore, Lake Superior; product, car-wheel and malleable pig iron; total annual capacity, 38,000 net tons. Brand, "Antrim." T. J. O'Brien, President; J. M. Barnett, Vice-President; J. C. Holt, Secretary and Treasurer; E. Fitzgerald, Manager, Mancelona. Iron sold from general office, and by Thomas A. Mack, Cincinnati.

Bangor Furnace, Bangor, Van Buren county. One stack, 43 x 9½, first blown in October 29, 1872; hot blast; annual capacity, 16,000 net tons. Owner, Mrs. D. C. Bradley, Chicago.

Carp River Furnace, Carp River Iron Company, Marquette, Marquette county. Building one stack, to take the place of one stack built in 1872-3, and burned in 1882.

Deer Lake Furnaces, Deer Lake Company, Ishpeming, Marquette county. Two stacks: one, 49 x 8, built in 1868; the other, 47 x 9, built in 1873, and put in blast in October, 1873; hot blast; steam and water power; ore, Lake Superior; product, car-wheel, malleable, and foundry pig iron; total annual capacity, 10,000 net tons. Brand, "Deer Lake." W. H. Rood, President and Treasurer; J. N. St. Clair, Secretary. Selling agents, Charles Himrod & Co., Chicago.

Detroit Iron Furnace Company, Newberry Building, Detroit. One

stack, 52 x 11, built in 1870; changed from bituminous coal to charcoal in 1879; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 22,000 net tons. Brand, "D. I. F." James McMillan, President; Hugh McMillan, Vice-President; E. C. Wetmore, Secretary; W. C. McMillan, Treasurer; A. Evans, Jr., Superintendent. Selling agents, W. F. Jarvis & Co., Detroit.

Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim county. One stack, 47 x 10½, first put in blast in July, 1873; hot blast; ore, Lake Superior entirely; specialty, Nos. 3 and 4 pig iron for car-wheels and malleable castings; daily average production, 60 net tons. The charcoal for this furnace is made in ten round and twenty-five rectangular brick kilns, holding, respectively, 50 and 100 cords each; chemical works are connected with them. Brand, "Elk Rapids." Propose raising height of furnace to 56 feet when blown out. N. K. Fairbank, President, and F. H. Head, Vice-President, Chicago; E. S. Noble, Secretary and Treasurer, and H. H. Noble, General Manager, Elk Rapids. Iron sold direct from furnace.

Eureka Furnaces, Eureka Iron and Steel Works, Detroit. Two stacks at Wyandotte, Wayne county. No. 1, 50 x 12, built in 1855, and rebuilt in 1884-5. No. 2, 45 x 9, built in 1863; formerly called Ward Furnace. Both use hot blast; ores, Lake Superior and Menominee; product, car-wheel and malleable pig iron; total annual capacity, 33,000 net tons. John Desmond, Superintendent of furnaces. Selling agents, M. A. Hanna & Co., Cleveland. *See Rolling Mills.*

Fayette Furnaces, Jackson Iron Company, Cleveland, Ohio. Furnaces at Fayette, Delta county. Two stacks, each 54 x 10½, built in 1867 and 1869; rebuilt in 1881; hot blast; ores, Jackson specular and hematite; product, Bessemer, foundry, malleable, and car-wheel pig iron; annual capacity of each furnace, 23,000 net tons; operates only one furnace at a time. Iron is known as "Fayette." The furnaces are 85 miles from the company's mines at Negaunee; built at Fayette, owing to the abundance of timber. There are 72 kilns at the works for producing charcoal. Samuel Mitchell, President, Negaunee, Mich.; William Chisholm, Treasurer, and George W. Billings, Secretary, Cleveland; W. E. Saunders, Superintendent, Fayette.

Frankfort Furnace Company, 32 and 34 Woodward avenue, (with Detroit Stove Works,) Detroit. Furnaces at South Frankfort, Benzie county. Two stacks, each 42 x 9½, built in 1870 and 1873; hot blast; total annual capacity, 27,000 net tons. M. B. Mills, President; W. H. Irvine, Secretary. Idle since 1885, and for sale.

Gaylord Iron Company, (successor to Detroit and Lake Superior Iron Manufacturing Company,) Detroit, Wayne county. One stack, 56 x 9½, built in 1857, and first put in blast March 16, 1857; remodeled in 1889; warm blast; ores, Lake Superior specular, magnetic, and hema-

tite; the pig iron is specially adapted for malleable castings; annual capacity, 13,000 net tons. Charles A. Kent, President; William M. Gaylord, Vice-President, Treasurer, and General Manager; Frank B. Gaylord, Secretary.

Gogebic Furnace, Iron River, Iron county. One stack, 56 x 11, built in 1885, and first blown in February 2, 1886. Owner, E. D. Reis, New Castle, Pa. Idle and for sale.

Iron Star Furnace Company, (formerly Leland Iron Company,) 12 and 13 Campan Building, Detroit. Furnace at Leland, Leelenaw county. One stack, 48 x 10, rebuilt in 1872; hot blast; water-power; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 13,500 net tons. Brand, "Iron Star." V. K. Moore, President; George W. Moore, Secretary and Treasurer.

Lake Huron Furnace, Lake Huron Iron Company, Caseville, Huron county. One stack, 54 x 9½, built in 1873, rebuilt in 1881; hot blast; daily capacity, 35 net tons. A. G. Stone, President and Treasurer, and D. E. Stone, Secretary, Cleveland, Ohio. Idle and for sale.

Martel Furnace Company, St. Ignace, Mackinac county. One stack, 53 x 10½, first put in blast August 15, 1881; two Whitwell stoves, each 60 x 15; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 23,000 net tons. Brand, "Martel." The furnace does not run on Sunday. C. W. Davenport, President, and E. W. Sheldon, Vice-President, Erie, Pa.; William B. Vance, Secretary and Treasurer, and S. D. Mills, Superintendent, St. Ignace.

Menominee Furnace, Menominee, Menominee county. One stack, 45 x 9½, built in 1872-3, blown in in August, 1873; hot blast. Idle since 1884.

Newberry Furnace Company, Newberry Building, Detroit. Furnace at Newberry, Luce county. One stack, 53 x 12, built in 1882-3, and blown in in May, 1883; four iron stoves; water jackets; closed top, with Lee Burt's patent charger; ore, hard and soft Lake Superior; product, car-wheel, malleable, and Bessemer pig iron; annual capacity, 28,000 net tons. Brand, "D. I. F. V." The charcoal is made at the works in 58 kilns, chemical works being connected with them. Hugh McMillan, President; W. C. McMillan, Vice-President; Claude W. Case, Secretary; W. K. Anderson, Treasurer; A. Evans, Jr., Manager. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Peninsular Furnace, Peninsular Iron Company, Detroit, Wayne county. One stack, 42 x 9½, built in 1863, put in blast in February, 1864; warm blast; open top, covered by a plate when not filling; ore, exclusively Lake Superior; specialty, car-wheel and malleable pig iron; annual capacity, 10,000 net tons. Brand, "P. I. Co., Det." Theodore H. Eaton, Jr., President; Robert Leete, Vice-President; Solon Burt, Secretary and Treasurer; Noah W. Gray, Assistant Secretary and Treasurer.

Pine Lake Furnace, Pine Lake Iron Company, Ironton, Charlevoix county. General office, Rookery Building, Chicago. One stack, 50 x 11, built in 1880-1, and put in blast in February, 1881; hot blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; estimated annual capacity, 30,000 net tons. Brand, "Champion." R. M. Cherrie, President; H. Duvall, Secretary; H. C. Dolph, Treasurer.

Pioneer Furnaces, Iron Cliffs Company, Negaunee, Marquette county. Two stacks: No. 1, 56 x 10, built in 1858; No. 2, 56 x 9, built in 1859; both stacks burned and rebuilt in 1877; ores, Lake Superior, red specular, and soft hematite; product, malleable and car-wheel pig iron; total annual capacity, 45,000 net tons. Brand, "Pioneer." John H. Abeel, President; Charles J. Canda, Treasurer, 11 Pine st., New York; A. Maitland, General Manager, Negaunee, Mich.; James Rood, Agent, Chicago.

Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 45 x 10½, built in 1879-80, first blown in March 2, 1880; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 23,000 net tons. Irving M. Bean, President, and Samuel Marshall, Vice-President and Treasurer, Milwaukee; J. C. Ford, Secretary and General Superintendent, Fruitport.

Union Iron Company, Jefferson avenue east, Detroit, Wayne county. One stack, 50 x 10½, built in 1871-2, and blown in in July, 1872; warm blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; annual capacity, 14,000 net tons. Brand, "U. I. Co., Det." Austin Burt, President; Wm. Gerhauser, Secretary, Treasurer, and Manager; W. C. Burt, Assistant Secretary and Treasurer.

Number of charcoal furnaces in Michigan: 26 completed stacks, and one stack building.

MIXED ANTHRACITE AND BITUMINOUS COAL.

Grace Furnace, Traverse Iron Company, 88 Washington st., Chicago. Furnace at Marquette. One stack, 63 x 17, built in 1872; fuel, when last in blast, mixed anthracite and bituminous coal; product, Bessemer pig iron; annual capacity, 15,000 net tons.

Number of mixed anthracite and bituminous coal furnaces in Michigan: one stack. Total number of furnaces in Michigan: 27 completed stacks, and one stack building.

WISCONSIN.

CHARCOAL.

Florence Furnace, H. C. Dolph, Rookery Building, Chicago, Ill. Furnace at Florence, Florence county. One stack, 40 x 8, first blown in November 13, 1881; hot blast; ore, Menominee range hematite; specialty, car-wheel pig iron; annual capacity, 6,000 net tons.

Fond du Lac Furnace, Wisconsin Furnace Company, lessee, 68 and 70 Dearborn st., Chicago, Ill. Furnace at Fond du Lac, Fond du Lac county. One stack, 52 by 10½, built in 1873-4, and first put in blast in 1883; hot blast; ore, Lake Superior; product, pig iron for foundry, car-wheel, and malleable purposes; annual capacity, 10,000 net tons. Wm. Deering, President; E. A. Hyde, Vice-President; J. F. Forsyth, Treasurer; W. H. Nelson, Superintendent. Sales agents, Forsyth, Hyde & Co., Chicago. Fond du Lac Iron Company, owner.

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; closed top; two Whitwell stoves; ore, Gogebic hematite; product, foundry, car-wheel, and malleable pig iron; annual capacity, 33,000 net tons. Brand, "Hinkle." A. H. Hinkle, President; W. H. Hinkle, Secretary and Treasurer; M. R. Hunt, Manager.

Minneapolis Furnace, York Iron Company, Black River Falls P. O., Jackson county. Main office, Minneapolis, Minn. One stack, 55 x 11, built in 1885-6; blown in in August, 1886; two Whitwell stoves, each 60 x 16; ore, principally from Gogebic range; product, pig iron for car-wheel, malleable, steel, and foundry purposes; annual capacity, 25,000 net tons. Brand, "Minneapolis." Samuel C. Gale, President; Charles S. Careins, Vice-President; Charles A. Eaton, Treasurer; Charles F. Fairfield, Secretary; Horace E. Burt, Manager. Selling agents, Forsyth, Hyde & Co., Chicago.

National Furnace, National Furnace Company, Depere, Brown county. One stack, 45 x 10½, built in 1869, and put in blast in February, 1870; hot blast; ores, Lake Superior, Menominee range, and Gogebic; product, all grades of charcoal pig iron; annual capacity, 22,000 net tons. Brand, "National." (Green Bay Furnace, at Green Bay, built in 1870, and one stack at Depere, built in 1872, have been abandoned.) Henry D. Smith, President; Eugene Smith, Secretary and General Manager; W. L. Brown, Treasurer. Selling agents, Pickands, Brown & Co., Chicago.

Sauk Furnace, Iron Mountain Ore and Furnace Company, Ironton, Sauk county. Telegraph address, La Valle. One stack, 30 x 8½, built in 1857; warm blast; open top; steam and water power; ore, native brown hematite; specialty, foundry and car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Sauk." F. Byrne, President; R. F. Hersey, Vice-President; J. C. O'Gorman, Secretary and Treasurer. Selling agents, Forsyth, Hyde & Co., Chicago.

Number of charcoal furnaces in Wisconsin: 6 stacks.

COKE.

Illinois Steel Company, Rookery Building, Chicago, Ill. Three stacks in Wisconsin: Milwaukee Works, located at Bay View, Milwaukee, Milwaukee county, have two stacks, (Nos. 3 and 4,) each 66 x 17,

built in 1870 and 1871; ores, $\frac{1}{2}$ Lake Superior and $\frac{1}{2}$ Iron Ridge; annual capacity, 65,000 net tons. Mayville Furnace, located at Mayville, Dodge county, has one stack, 67 x 13, built in 1848 as a charcoal furnace, rebuilt in 1872 and 1884, and remodeled and enlarged in 1887 to use coke; ores, Menominee, Gogebic, and local; annual capacity, 20,000 net tons. Fuel used at both works, Connellsville coke; product, Bessemer, foundry, and mill pig iron. *See Furnaces in Illinois. See Rolling Mills in Illinois and Wisconsin.*

Minerva Furnace, Minerva Furnace Company, lessee, 70 Dearborn st., Chicago. Furnace at Milwaukee. One stack, 55 x 15, built and put in blast in the summer of 1873; leased by present company in 1889; fuel, coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 28,000 net tons. E. A. Hyde, President; W. H. Ross-Lewin, Vice-President and Secretary; J. F. Forsyth, Treasurer. Sales agents, Forsyth, Hyde & Co., Chicago.

West Superior Iron and Steel Company, West Superior, Douglas county. Foundations started for one 80 x 18 coke furnace, to be completed in 1891. James Roosevelt, President, Hyde Park, N. Y.; Francis H. Weeks, Secretary and Treasurer, 120 Broadway, New York; Wm. F. Mattes, General Manager, West Superior.

Number of coke furnaces in Wisconsin: 4 completed stacks, and one stack building. Total number of furnaces in Wisconsin: 10 completed stacks, and one stack building.

MINNESOTA.

COKE.

Duluth Iron and Steel Company, Duluth, St. Louis county. Building one stack, 75 x 16, to use coke; three Gordon-Whitwell-Cowper stoves.

R. S. Munger, President; W. H. H. Stowell, Secretary.

Number of furnaces in Minnesota: one coke stack building.

MISSOURI.

COKE.

Jupiter Iron Works, Jupiter Furnace Company, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873, blown in for the first time in 1880; remodeled in 1887; three Gordon-Whitwell-Cowper stoves; fuel, coke; ores, Iron Mountain and Pilot Knob and about $\frac{1}{2}$ red hematite; annual capacity, 50,000 net tons. W. O. Garrison, Secretary.

Missouri Furnaces, Missouri Furnace Company, 204 North Third st., St. Louis. Two stacks, each 56 x 15, built in 1870, and remodeled in 1887; two Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ores, Iron Mountain, Shepherd Mountain, Pilot Knob, and Southwest; product, mainly Bessemer pig iron; total annual capacity, 50,000 net

tons. Brand, "Missouri." Edwin C. Cushman, President; C. McKinley, Vice-President; Charles A. McNair, Secretary.

St. Louis Ore and Steel Company, Granite Building, St. Louis. Two stacks at South St. Louis, St. Louis county, formerly called Vulcan Iron Works. One stack, 63 x 16, built in 1869, and one, 75 x 18, built in 1872, and rebuilt in 1886; one stack has iron stoves, and the other three Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ore, Pilot Knob; product, Bessemer pig iron. (One stack, built in 1869, will be dismantled.) E. A. Hitchcock, President; O. L. Garrison, Secretary and Treasurer. *See Pilot Knob (charcoal) Furnace. See Rolling Mills.*

Number of coke furnaces in Missouri: 5 stacks.

CHARCOAL.

Midland Furnace, Midland Blast-Furnace Company, Midland, Crawford county. Main office, Turner Building, St. Louis. One stack, 50 x 10, built in 1874-5, blown in April 10, 1875, and rebuilt in 1877; either cold or hot blast; ores, red and brown hematite; product, pig iron for steel purposes; annual capacity, 15,000 net tons. The furnace stack is wholly built of fire-brick, 22½ inches thick. Brand, "Midland." William H. Lee, President; E. A. Hitchcock, Vice-President; T. F. Turner, Secretary; B. B. Reagan, Superintendent.

Pilot Knob Furnace, St. Louis Ore and Steel Company, Granite Building, St. Louis. Furnace at Pilot Knob, Iron county. One stack, 60 x 11, built in 1848, remodeled in 1879; hot blast; ore, Pilot Knob; product, Bessemer pig iron; annual capacity, 12,000 net tons. G. W. Craine, Manager. *See Coke Furnaces. See Rolling Mills.*

Sligo Furnace Company, Sligo, Dent county. General office, 411 Olive st., St. Louis. One stack, 55 x 11, built in 1880, and first put in blast in October, 1880; hot blast; ores, blue specular and red oxide, mined near the furnace; product, Bessemer, foundry, and mill pig iron; annual capacity, 17,000 net tons. Brand, "Sligo." H. A. Crawford, President and Treasurer, St. Louis; A. L. Crawford, Vice-President, New Castle, Pa.; E. L. Foote, Secretary and Superintendent, Sligo.

Number of charcoal furnaces in Missouri: 3 stacks. Total number of furnaces in Missouri: 8 stacks.

COLORADO.

COKE.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. New York office, Mills Building, 15 Broad st. Two stacks: one, 65 x 15, built in 1880-1, and blown in September 7, 1881; and one, 75 x 17, completed in 1887; seven Siemens-Cowper-Cochrane stoves; fuel, coke, produced at the company's coke ovens at El Moro; ores, native

magnetic and hematite; annual capacity, 60,000 net tons. *See Rolling Mills.*

Number of furnaces in Colorado: 2 coke stacks.

OREGON.

CHARCOAL.

Oswego Furnace, Oregon Iron and Steel Company, Oswego, Clackamas county. Main office and telegraph address, 106 Third st., Portland. One stack, 60 x 13, built in 1888, and first blown in in October, 1888; three Whitwell stoves; iron shell; water-power; fuel, charcoal, made exclusively from fir; ore, 35 per cent. brown hematite, worked raw; product, No. 1 foundry pig iron; annual capacity, 15,000 net tons. Brand, "Oregon." (One stack built in 1866-7 has been abandoned.) S. G. Reed, President; Wm. M. Ladd, Vice-President; Martin Winch, Secretary; F. C. Smith, General Superintendent. Selling agent, S. R. Church, San Francisco. The company owns and operates a cast-iron pipe foundry at Oswego.

Number of furnaces in Oregon: one charcoal stack.

WASHINGTON.

CHARCOAL.

Irondale Furnace, Puget Sound Iron Company, Irondale, Jefferson county. Main office, 328 Montgomery st., San Francisco, Cal. One stack, 50 x 10, built in 1880-1, and blown in January 27, 1881; rebuilt in 1882-3, and remodeled in 1884; iron stove; closed top, with patent bell and hopper; fuel, charcoal; ores, bog and magnetic, mined in Jefferson county, and on Texada Island, British Columbia; product, No. 1 foundry pig iron; annual capacity, 10,000 net tons. Brand, "Texada." George W. Prescott, President; John F. Merrill, Vice-President; Charles H. Simpkins, Treasurer; A. Halsey, Secretary; George Froescher, Superintendent. Selling agent, C. H. Simpkins, San Francisco.

Number of furnaces in Washington: one charcoal stack.

UNITED STATES.

Total number of furnaces in the United States in November, 1889, which are now active or may readily be put in blast: 575 completed stacks, and 27 stacks building. Of these 146 are completed charcoal furnaces, 190 anthracite or mixed anthracite and coke furnaces, and 239 furnaces using coke or raw bituminous coal chiefly. Of the 27 furnaces under construction 17 are coke, 3 are anthracite and coke, and 7 are charcoal. There is also one furnace in New Jersey which has been partly constructed, but on which work has been suspended.

FURNACES ABANDONED OR LIKELY TO BE LONG INACTIVE.

NOTE.—Some of the furnaces named in this list are supplied with good machinery, and circumstances may at some time favor their revival, but the probabilities are that all the furnaces in this list which are not already abandoned will long remain inactive.

VERMONT.

Pittsford Furnace, Pittsford, Rutland county. Built in 1844. Not in blast since 1882. Fuel, charcoal.

Shaftsbury Iron Works, South Shaftsbury, Bennington county. Built in 1863. Fuel, charcoal. Last blast ended in March, 1876.

MASSACHUSETTS.

Lenox Iron Works, Lenox Furnace, Berkshire county. One stack, built in 1765, and rebuilt in 1837. Fuel, charcoal. Torn down in 1880.

Pomeroy Iron Works, West Stockbridge, Berkshire county. One stack, built in 1850, burned and rebuilt in 1872. Fuel, anthracite. Not in blast for a number of years.

CONNECTICUT.

Chapinville Furnace, Chapinville, Litchfield county. Built in 1825, burned in 1879, and rebuilt in 1881. Fuel, charcoal. Furnace in a dilapidated condition. Property owned by Mrs. Hattie Lee, Salisbury.

Shepaug Iron Company, Roxbury, Litchfield county. One stack, built in 1866. Fuel, charcoal. Has made no iron since 1872.

NEW YORK.

CHARCOAL.

Alpine Furnace, Z. H. Benton, Antwerp, Jefferson county. Furnace at Diana, Lewis county. One stack, built in 1846, and blown in during 1848. Furnace lands comprise 40,000 acres. Not in blast for several years.

Carthage Furnace, Carthage Iron Company, Carthage, Jefferson county. One stack, built in 1818, and rebuilt in 1881. Burned in 1885.

Fletcherville Furnace, Witherbees & Fletcher, Mineville, Essex county. Built in 1863-4; abandoned in 1875.

Fullerville Iron Works, George H. Clarke, Fullerville, St. Lawrence county. One stack, built in 1833. Not in blast for several years.

Greenwood Furnace, Parrott Iron Company, Greenwood Iron Works, Orange county. Built in 1813. Has not been in blast since September, 1871.

Jefferson Iron Company, Antwerp, Jefferson county. Two stacks: Sterlingbush Furnace, at Sterlingbush, Lewis county, built in 1852; Sterlingville Furnace, at Sterlingville, Jefferson county, built in 1866.

Napanoch Furnace, Napanoch, Ulster county. One stack, built prior to 1854; torn down in 1883.

Norwich Furnace, Norwich, Chenango county. Built in 1856, and repaired in 1873; abandoned in 1880.

Shaparoon Iron Works, James Beckley, Dover Furnace P. O., Dutchess county. One stack, built in 1881, burned in 1883, and not rebuilt.

MIXED ANTHRACITE AND COKE.

Clove Furnace, Greenwood Iron Works P. O., Orange county. One stack, 55 x 16, built in 1854; dismantled in 1887.

Columbia and Fort Edward Furnaces, Troy Steel and Iron Company, Troy. Columbia Furnace, at Hudson, Columbia county, built about 1860; abandoned in 1885, and torn down. Fort Edward Furnace, at Fort Edward, Washington county, built in 1853; abandoned in 1885.

Fletcher Furnace, Buffalo, Erie county. One stack, built in 1863. Made its last blast in 1885, and was then dismantled.

Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. No. 1 furnace, built in 1870, torn down in 1887, with a view of replacing it with a larger stack.

Furnaceville Furnace, Furnaceville, Wayne county. Formerly called Ontario Furnace. One stack, first put in blast in October, 1870, and rebuilt in 1880; abandoned in 1887.

Jagger Iron Works, P. J. McArdle, Albany. Two stacks, on Van Rensselaer Island, built in 1871. Formerly called Corning Iron Works.

Manhattan Iron Works, Manhattan Iron Works Company, Manhattanville, New York City. Two stacks, built in 1851 and 1857; abandoned and torn down in 1889.

Poughkeepsie Iron Company, Albert Tower, President and Agent, Poughkeepsie, Dutchess county. Two stacks, built in 1848 and 1854; not in blast since 1886; sold and dismantled in 1889.

Union Iron Works, Union Iron Company of Buffalo, Buffalo, Erie county. Three stacks: No. 1 built in 1861; No. 2 built in 1862; No. 3 built in 1865. Have not been in blast since 1876.

NEW JERSEY.

Oxford Iron Works, Oxford, Warren county. One stack, 36 x 10, built in 1742; stack still standing.

Stephens Furnace, Rustic, Morris county. One stack, built in 1877.

PENNSYLVANIA.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Allentown Iron Works, Allentown Iron Company, Allentown, Lehigh county. Three stacks, built in 1846 and 1853; abandoned.
- Atlas Furnace, Roaring Branch, Lycoming county. Built in 1854.
- Bethlehem Iron Company, Bethlehem, Northampton county. One stack, No. 3 Furnace, built in 1868; not likely to be again put in blast.
- Chestnut Hill Furnace, Columbia, Lancaster county. One stack, No. 1 Furnace, built in 1845; abandoned.
- Dauphin Furnace, Dauphin, Dauphin county. One stack, built in 1854, and remodeled in 1872 for anthracite; burned in 1883.
- Donegal Furnace, Columbia, Lancaster county. Furnace at Vesta, near Marietta. One stack, built in 1848.
- Durham Iron Works, Riegelsville, Bucks county. Two stacks, built in 1848 and 1851; torn down.
- Frances Furnace, Estate of James S. Marsh, Lewisburg. Furnace at Northumberland. One stack, built in 1872; has been long idle; standing in good condition.
- Harrisburg Furnace, Harrisburg, Dauphin county. Formerly called Porter Furnace. Built in 1844, and torn down in 1881.
- Lebanon Furnace, Lebanon, Lebanon county. One stack, built in 1847; torn down.
- Lycoming Furnace, Ralston, Lycoming county. One stack, first put in operation in August, 1874, but only in blast for a short time.
- Mansfield Furnace, Mansfield, Tioga county. One stack, built in 1854; abandoned in 1884.
- Monocacy Furnace, Monocacy, Berks county. Built at Hopewell in 1852; removed to Monocacy in 1854; dismantled in 1888.
- Montour Iron and Steel Company, Danville, Montour county. One stack, 34 x 14, built in 1842; abandoned in 1880.
- Pennsylvania Steel Company, Steelton, Dauphin county. Furnace No. 5, built in 1873-4, and remodeled in 1882; torn down in 1888.
- Pioneer Furnace, Pottsville, Montgomery county. No. 1 furnace, rebuilt in 1853; torn down in 1889.
- Plymouth Furnaces, Conshohocken, Montgomery county. Two stacks, built in 1845 and 1864; abandoned in 1889, and No. 2 dismantled.
- St. Clair Furnace, St. Clair, Schuylkill county. Built in 1845; abandoned in 1880.
- Stanhope Furnace, Pine Grove, Schuylkill county. Built in 1825; not in blast since 1880.
- William Penn Furnace, D. O. Hitner, William Penn P. O., Montgomery county. One stack, 40 x 12½, built in 1854. Idle, and water-power used for a paper-mill. (Two stacks, one built in 1844 and one built in

1845, were purchased by the Pennsylvania Schuylkill Valley Railroad Company in 1883 and torn down.)

Wister Furnace, Harrisburg, Dauphin county. One stack, first blown in in 1868; abandoned in 1889.

BITUMINOUS COAL AND COKE.

Allegheny Furnace, Altoona, Blair county. Built in 1811, rebuilt in 1847; idle for a number of years.

Alpha Furnace, Norristown, Montgomery county. Built in 1881 to smelt iron ore with gas fuel; operated for a short time with coke.

Bennington Furnace, Blair Iron and Coal Company, Bennington, Blair county. One stack, built in 1856; abandoned in 1885; torn down.

Brady's Bend Iron Company, Brady's Bend, Armstrong county. Four stacks, built from 1842 to 1845; dismantled in 1878-9.

East Conemaugh Furnace, Cambria Iron Company, East Conemaugh, Cambria county. Built in 1857, and rebuilt in 1883; torn down in 1888, and will probably be rebuilt.

Eliza Furnace, Laughlin & Co. Limited, Pittsburgh, Allegheny county. One stack, built in 1861; torn down in 1888.

Elizabeth Furnace, Sabbath Rest, Blair county. Built in 1832; idle for several years.

Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871-2; torn down in 1872.

Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, built in 1869, enlarged in 1879.

Fairchance Furnace, Fairchance, Fayette county. One stack, built in 1804, and rebuilt in 1871; dismantled in 1887.

Frankstown Furnace, Frankstown, Blair county. One stack, built in 1836, rebuilt in 1872; torn down in 1888.

Glamorgan Iron Company, Lewistown, Mifflin county. One stack, built in 1868; dismantled in 1885.

Juniata Furnace, Williamsburg, Blair county. One stack, built in 1857.

Lawrence Furnace, New Castle, Lawrence county. Built in 1846; fuel, coke and charcoal; abandoned in 1873.

Lemont Furnace, R. Hogsett & Co., Lemont Furnace P. O., Fayette county. One stack, built in 1875, and rebuilt in 1885; torn down in 1886, and machinery removed to Trussville Furnace, in Alabama.

Little Pet Furnace, New Castle, Lawrence county. One stack, built in 1853; has not been in blast for a number of years.

Mahoning Furnace, Mahoning Furnace P. O., Armstrong county. One stack, built in 1845; dismantled in 1886.

Middlesex Furnace, West Middlesex, Mercer county. Built about 1855; abandoned in 1875.

Monticello Furnace, Monticello, Armstrong county. Built in 1859; abandoned in 1876.

- Mount Hickory Furnaces, Sharpsville, Mercer county. Two stacks, built in 1869; torn down in 1886.
- Pennsylvania Furnace, Pennsylvania Furnace P. O., Huntingdon county. One stack, built in 1813; changed from charcoal to coke in 1881. Idle, and will probably never run again.
- Pine Creek Furnace, Kittanning, Armstrong county. Built in 1846; abandoned and dismantled in 1879.
- Rodman Furnaces, Duncan Heirs, Roaring Springs, Blair county. Two stacks, built in 1846, and rebuilt in 1879-80.
- Shenango Furnaces, Sharon, Mercer county. Two stacks, built in 1859; torn down in 1882.
- Sligo Furnace, Sligo, Clarion county. One stack, built in 1845; abandoned in 1873.
- Sophia Furnace, New Castle, Lawrence county. Built in 1872, and rebuilt in 1874; dismantled in 1887.
- Stewardson Furnace, Mahoning, Armstrong county. One stack, built in 1848-9.
- Superior Furnaces, Allegheny City, Allegheny county. Two stacks, built in 1862-3; torn down in 1882.
- Wampum Furnace, Wampum, Lawrence county. One stack, built in 1856; torn down in 1887.
- Wheatland Furnaces, Wheatland, Mercer county. Four stacks, built from 1860 to 1865; out of blast since September, 1875.

CHARCOAL.

- Augusta Furnace, Newville, Cumberland county. Furnace near Shipensburg.
- Barree Furnace, Barree Forge P. O., Huntingdon county. One stack, built in 1863; not in blast for several years.
- Big Pond Furnace, Newville, Cumberland county. Built in 1836; burned in 1880.
- Cleversburg Furnace, Clever & Sons, Cleversburg, Cumberland county. One stack, built in 1881, and remodeled in 1882; idle since 1885, and no prospects of ever starting again.
- East Penn Furnace, Bowmanstown, Carbon county. One stack, built in 1837.
- Forest Iron Works, White Deer Mills, Union county. One stack, built in 1846.
- Franklin Furnace, Edenville, Franklin county. Built in 1828.
- Greenwood Furnace, Greenwood, Huntingdon county. One stack, built in 1833; not in use since 1882.
- Hampton Furnace, E. and G. Brooke Iron Company, Birdsboro, Berks county. One stack, built in 1846, and rebuilt in 1872.
- Hecla Furnace, Milesburg, Centre county. One stack, built in 1820; abandoned in 1864.

- Hope Furnace, Rose Point, Lawrence county. One stack, built in 1868; not in blast for several years.
- Hopewell Furnace, James Eichelberger & Co., Hopewell, Bedford county. One stack, built in 1800; idle for a number of years until 1887, when it was put in blast for a short time; now idle, and not likely to again be operated.
- Howard Furnaces, Howard, Centre county. Two stacks: one built in 1830, torn down in 1883, and one built in 1833, abandoned in 1889.
- Jefferson Furnace, Jefferson, Schuylkill county. One stack, built in 1864; abandoned in 1879.
- Laura Furnace, Millerstown, Perry county. Built in 1873.
- Logan Furnace, Bellefonte, Centre county. Built in 1806, and rebuilt three miles from original site in 1843; abandoned in 1886.
- Madison Furnace, Sligo, Clarion county. Built in 1836; abandoned in 1874.
- Manada Furnace, Swatara Station, Dauphin county. Built in 1836; abandoned in 1874.
- Mount Etna Furnace, Yellow Springs, Blair county. One stack, built in 1808, and rebuilt in 1850; not in blast since 1877.
- Mount Hope Furnace, Mount Hope, Lancaster county. One stack, built in 1784.
- Mount Penn Furnace, Reading, Berks county. One stack, built in 1830; abandoned in 1883.
- Niagara Furnace, Mill Hall, Clinton county. Built in 1830, abandoned in 1857, and revived in 1880. Formerly called Mill Hall Furnace. Idle for several years.
- Oley Furnace, Clymer Iron Company, Temple, Berks county. Furnace in Oley township. Built in 1772; dismantled in 1888.
- Rebecca Furnace, Martinsburg, Blair county. One stack, built in 1817, and rebuilt in 1839.
- Rockhill Furnace, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Built in 1830; abandoned in 1873.
- Rockland Furnace, in Berks county. Built in 1791, rebuilt in 1879, and burned in 1881. Formerly called Sally Ann Furnace.
- Sarah Furnace, Sarah, Blair county. Built in 1824; idle since 1874.
- Sarah Ann Smith Furnace, Bower's Station, Berks county. One unfinished stack, 30 x 10 $\frac{3}{4}$, begun in 1883.
- Springfield Furnace, Williamsburg, Blair county. One stack, built in 1814; made its last blast in 1885.
- Spring Hill Furnace, Fairchance Furnace Company, Smithfield, Fayette county. One stack, built in 1805; dismantled in 1883.
- Windsor Furnace, Leesport, Berks county. One stack, built about 1830; idle since 1883, and practically abandoned.
- York Furnace, in York county. One stack, built in 1830; made its last blast in 1874.

MARYLAND.

BITUMINOUS COAL AND COKE.

Bowery Furnace, Cumberland Coal and Iron Company, Frostburg, Alleghany county. One stack, built in 1868, and rebuilt in 1873; dismantled in 1883.

Elk Ridge Furnace, Elk Ridge Landing, Howard county. Rebuilt in 1855; not in blast since 1874.

Green Spring Furnace, Green Spring Furnace, Washington county. Telegraph address, Clear Spring. One stack, built in 1848, rebuilt in 1865. Idle for many years, and for sale.

Knoxville Furnace, Knoxville, Frederick county. Built in 1837; not in blast since 1874. Formerly called Longcoming Furnace.

CHARCOAL.

Cedar Point Charcoal Furnace, Baltimore, Baltimore county. One stack, built in 1843; idle since 1884, and dismantled.

Chesapeake Furnaces, Canton, Baltimore. Two stacks: one built in 1853, dismantled in 1883; and one built in 1846, remodeled in 1882, and dismantled in 1889.

Harford Furnace, Harford Furnace P. O., Harford county. Built in 1828; idle since 1878.

La Grange Furnace, The Rocks P. O., Harford county. Built in 1836.

Locust Grove Furnace, Furstenburg & Adler, Rossville, Baltimore county. One stack, built in 1849; dismantled in 1889.

MIXED ANTHRACITE AND COKE.

Cedar Point Anthracite Furnace, Baltimore. One stack, built in 1873; idle since 1885, and dismantled.

VIRGINIA.

COKE.

Augusta Furnace, Ferrol P. O., Augusta county. One stack, built in 1864, rebuilt in 1878.

Buffalo Gap Furnaces, Buffalo Gap, Augusta county. Two stacks, built in 1869 and 1873; not in blast for several years.

Callie Furnace, Hileman, Waring & Co., Clifton Forge, Alleghany county. Furnace in Botetourt county. One stack, built in 1873-4 for charcoal, but since enlarged and changed to coke. O. Hileman, Superintendent. Idle since 1884.

Powhatan Furnace, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Furnace in Henrico county, on the Richmond and Alleghany Railroad, five miles above Richmond. Built in 1860, and rebuilt in 1872-3. Formerly called Westham Furnace. Idle since 1876.

CHARCOAL.

Amherst Furnace, Estate of S. F. Jordan, Snowden, Amherst county.

One stack, built in 1863; out of blast since 1884.

Barren Springs Furnace, Reed Island, Wythe county. One stack, built in 1853.

Catharine and No. 2 Furnaces, Shenandoah Iron Company, Milnes, Page county. Two stacks, built in 1836 and 1857; dismantled.

Elizabeth Furnace, at Powell's Fort, in Shenandoah county. One stack, built in 1843, and rebuilt in 1883; dismantled in 1887.

Glenwood Furnace, F. T. Anderson, Glenwood, Rockbridge county. One stack, 35 x 8½, rebuilt in 1874; idle since 1877.

Grace Furnace, Tredegar Company, Richmond. Furnace at Craig's Creek, Botetourt county. One stack, built in 1850, rebuilt in 1873.

Laurel Furnace, in Lee county. Rebuilt in 1873, but only made a short blast.

Mine Run Furnace, in Shenandoah county. Built in 1872.

Mount Vernon Furnace, Abbott Iron Company, Baltimore, Md. Furnace near Weyer's Cave, Rockingham county. Built in 1848.

Panther Gap Furnace, near Goshen, Rockbridge county. One stack, built in 1874.

Victoria Furnace, Tolersville, Louisa county. Built in 1835; out of blast since 1873.

Virginia Furnace, Waynesboro, Augusta county. One stack, built in 1804. Formerly called Mount Torrey Furnace.

WEST VIRGINIA.

CHARCOAL.

Bloomery Furnace, Bloomery Furnace Company, Bloomery P. O., Hampshire county. One stack, built in 1844, and rebuilt in 1880; idle since 1880.

Capon Iron Works, J. J. & S. E. Keller, Capon Iron Works P. O., Hardy county. One stack, built in 1832; out of blast since 1880.

Elk River Furnace, Strange Creek, Braxton county. One stack, built in 1874-6. Owned by P. B. Adams, Braxton C. H., W. Va. Out of blast since 1881.

Gladeville Furnace, Gladeville, Preston county. Built in 1872.

Kanawha Iron Company, Coal Valley, Fayette county. One stack, begun in 1875, but not completed.

Virginia Furnace, Falls of Muddy Creek, Preston county. One stack, built in 1855.

COKE.

Waldorf Furnace, Irontown, Taylor county. One stack, built in 1873; dismantled in 1889, and machinery removed to Lawrence Furnace, Culbertson, Lawrence county, Ohio.

KENTUCKY.

CHARCOAL.

- Bath Furnace, Young's Springs, Bath county. One stack, built in 1839, rebuilt in 1872-3.
- Buena Vista Furnace, Ashland, Boyd county. Built in 1848; dismantled in 1876.
- Buffalo Furnace, Argillite, Greenup county. One stack, built in 1851; not in blast since 1875.
- Charlotte Furnace, Grayson, Carter county. One stack, built in 1873.
- Cottage Furnace, Union Hall, Estill county. One stack, built in 1855.
- Fitchburg Furnaces, Kentucky Union Land Company, Furnace P. O., Estill county. Two stacks, built in 1869; have not been in blast since 1874.
- Hematite Furnace, Trigg county. Formerly called Centre Furnace. One stack, built in 1852.
- Kenton Furnace, Damarin & Co., Portsmouth, Ohio. Furnace in Greenup county. One stack, built in 1856.
- Laura Furnace, Laura Furnace P. O., Trigg county. Built in 1851.
- Laurel Furnace, Riverton, Greenup county. One stack, built in 1849.
- Mount Savage Furnace, Mount Savage, Carter county. One stack, built in 1848.
- Pennsylvania Furnace, in Greenup county. Built in 1848; discontinued in 1881.
- Pine Grove Furnace, in Greenup county. One stack, built in 1881.
- Pioneer Furnace, Louisa, Lawrence county. One stack, built in 1881.
- Raccoon Furnace, Greenup, Greenup county. One stack, built in 1831.
- Trigg Furnace, Trigg Furnace P. O., Trigg county. One stack, built in 1871; has not been in blast since 1876.

COKE.

- Kenton Furnace, Newport. Built in 1869; machinery removed in 1877 to the Crafts Furnace, Ohio, by the Crafts Iron Company.

TENNESSEE.

CHARCOAL.

- Bear Spring Furnace, in Stewart county. One stack, built in 1832, abandoned in 1854, and rebuilt in 1873. Owned by M. T. Scott, Bloomington, Illinois. Will not be again worked in its present shape.
- Brownsport Furnace, Brownsport Furnace P. O., Decatur county. One stack, built in 1850.
- Carter Furnace, Carter's Furnace P. O., Carter county. Built in 1840; abandoned in 1887.
- Clark Furnace, Stribling, Stewart county. Built in 1854, burned and rebuilt in 1881; abandoned in 1883.

- Dougherty's Furnace, Baker's Gap, Johnson county. Built in 1878; made but a short blast.
- Dover Furnace, in Stewart county. Built in 1828, and rebuilt in 1854; has been idle for many years.
- Eagle Furnace, Bristol, Sullivan county. Built in 1838; not in blast since 1875.
- Embreeville Furnace, Jonesboro, Washington county. Built in 1846; out of blast since 1874.
- Great Western Furnace, Dover, Stewart county. One stack, built in 1854.
- Napier Furnace, Chief P. O., Lawrence county. Built in 1860.
- Pottsdale Furnace, Greeneville, Greene county. Built in 1862; out of blast since 1874.
- Rose and Crockett Iron Works, Cumberland Gap, Claiborne county. One stack, built in 1823.
- Rough and Ready Iron Works, Rough and Ready Furnace P. O., Stewart county. One stack, built in 1850, rebuilt in 1868.
- Speedwell Furnace, Speedwell, Claiborne county. One stack, built in 1825.
- Sullivan County Furnace, Union Depot, Sullivan county. One stack, built in 1881; operated only a short time.
- Unaka Furnace, Unaka, Greene county. Built in 1868; out of blast since 1874.
- Vernon Furnace, in Montgomery county. Built in 1833; has been out of blast for many years.
- Wayne Furnace, in Wayne county. Built in 1856; out of blast since 1875.
- Worley Furnace, Dickson, Dickson county. Built in 1847; made a blast on coke in 1879.

COKE.

- Oakdale Furnace, Jenks, Roane county. Built in 1873.

NORTH CAROLINA.

CHARCOAL.

- American Iron and Steel Company, Lockville, Chatham county. Office with the Lobdell Car-wheel Company, Wilmington, Delaware. Two stacks: Buckhorn Furnace, built in 1873; Endor Furnace, built in 1861-5, remodeled in 1872-3. These furnaces have been idle for a number of years, but they are in condition to go into blast again when railroads are built to convey ore to them.
- Madison Furnace, Lincolnton, Lincoln county. One stack, built in 1810; not in blast for many years.
- Ore Hill Furnace, Ore Hill, Chatham county. One stack, built in 1862; not in blast since 1873.

GEORGIA.

CHARCOAL.

Diamond Furnace, Cartersville, Bartow county. One stack, built in 1856. Ran on spiegeleisen and ferro-manganese in 1875.

Pool Furnace, Cartersville, Bartow county. Built in 1855; not in blast since 1874.

Rogers Furnace, Cartersville, Bartow county. One stack, built in 1873.

Thomas & Brown, Stamp Creek, Bartow county. Two stacks: Oak Grove Furnace, built in 1842; "The New Stack," built in 1863.

COKE.

Bartow Iron Works, in Bartow county. Two stacks, built in 1871 and 1873; one stack torn down in 1881.

ALABAMA.

CHARCOAL.

Cornwall Iron Works, Cedar Bluff, Cherokee county. Built in 1862.

McKee Furnace, Irondale Furnace P. O., Jefferson county.

Montgomery Furnace, Montgomery Furnace and Chemical Company, Montgomery, Montgomery county. Commenced the building of one charcoal stack in 1887; company failed, and furnace not completed.

TEXAS.

CHARCOAL.

Lou-Ellen Furnace, Kellyville, Marion county. One stack, built in 1869, rebuilt in 1873-4, 1882, and 1886; torn down in 1888.

OHIO.

CHARCOAL.

Bertha Furnace, Cecil, Paulding county. One stack, built in 1865; machinery removed in 1889.

Cambria Furnace, Samsonville, Jackson county. Built in 1854; out of blast since 1875.

Clinton Furnace, Wheelersburg, Scioto county. Built in 1832; out of blast since 1873.

Cornelia Furnace, Cornelia Furnace Company, Jackson, Jackson county. One stack, 37 x 10½, built in 1853, and first put in blast in 1854; torn down in 1889.

Eagle Furnace, Oretton, Vinton county. One stack, built in 1852; abandoned in 1883.

Etna Furnace, Ironton, Lawrence county. One stack, built in 1832; abandoned in 1885.

- Gallia Furnace, in Gallia county. One stack, built in 1847; abandoned in 1883.
- Grant Furnace, Ironton, Lawrence county. One stack, built in 1869; dismantled in 1883.
- Hamden Furnace, Hamden Furnace Company, Portsmouth, Scioto county. Furnace at Hamden Junction P. O., Vinton county. One stack, built in 1854; idle since 1883.
- Hope Furnace, Hope Furnace P. O., Vinton county. Formerly called Big Sand Furnace. One stack, built in 1854; has not been in blast since 1874.
- Howard Furnace, Lyra P. O., Scioto county. One stack, built in 1853; idle for many years.
- Jackson Furnace, in Jackson county. Built in 1839.
- Keystone Furnace, Keystone, Jackson county. One stack, built in 1849.
- Latrobe Furnace, Berlin X Roads, Jackson county. One stack, built in 1854.
- Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. One stack, built in 1834, and rebuilt in 1860; idle since 1881, and will not be operated again.
- Logan Furnace, Logan, Hocking county. One stack, built in 1852; abandoned in 1883.
- Manhattan Furnace, Toledo. Built in 1866.
- Maumee Furnace, Antwerp, Paulding county. Built in 1865; abandoned in 1886.
- Monitor Furnace, Petersburg, Lawrence county. One stack, built in 1868; abandoned in 1885.
- Monroe Furnace, Monroe Furnace P. O., Jackson county. One stack, built in 1856.
- Ohio Furnace, in Scioto county. Built in 1845; abandoned in 1881.
- Richland Furnace, Richland, Vinton county. One stack, built in 1854; not in blast for several years.
- Union Furnace, Union Furnace P. O., Hocking county. One stack, built in 1853.

BITUMINOUS COAL AND COKE.

- Ashland Furnace, Mineral Ridge, Trumbull county. One stack, built in 1859.
- Eagle Furnace, Youngstown, Mahoning county. Built in 1846; dismantled in 1888, and machinery removed to Youngstown by the Brier Hill Iron and Coal Company.
- Elizabeth Furnace, Niles, Trumbull county. Built in 1859; torn down.
- Glasgow-Port-Washington Iron and Coal Company Limited, Port Washington, Tuscarawas county. Two stacks, built in 1873-4. Machinery removed to Pittsburgh, Pa., in 1882.
- Globe Furnace, Jackson, Jackson county. Built in 1872.

- Grace Furnace No. 2, Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Built in 1861; abandoned and torn down in 1887.
- Haselton Furnace, Haselton, Mahoning county. Built in 1868; not now in use.
- Himrod Furnace, Youngstown, Mahoning county. Built in 1868; torn down in 1887.
- Lee Furnace, Monday, Hocking county. Built in 1877-8; dismantled in 1888.
- Massillon Furnace, Massillon, Stark county. Built in 1854; abandoned in 1880.
- Morgan Furnace, Irondale, Jefferson county. Built in 1870.
- Newburgh Furnace, Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Built in 1864; torn down in 1884.
- Ophir Furnace, Jackson, Jackson county. Built in 1874; abandoned and material used in building Eliza Furnace, at Wellston, Jackson county.
- Orange Furnace, Jackson, Jackson county. Built in 1864; out of blast since 1874.
- Porter Furnace, Mineral Ridge, Trumbull county. Built in 1860; made its last blast in 1873.
- Tod Furnace No. 2, Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Built in 1880; torn down in 1887.
- Vinton Furnace, Vinton Station, Vinton county. One stack, built in 1854. Has not been in blast for several years.
- Volcano Furnace, Massillon, Stark county. One stack, built in 1855; idle for many years.
- Warren Furnace, Warren, Trumbull county. Built in 1870; burned in 1878.
- Washington Furnace, Washington Furnace, Lawrence county. One stack, built in 1853.

INDIANA.

BITUMINOUS.

- Lafayette Furnace, Otter Creek, Clay county. Built in 1868; torn down in 1879.
- Planet Furnace, Harmony, Clay county. Built in 1867; torn down in 1877.
- Vigo Furnace No. 1, Terre Haute, Vigo county. Built in 1869; removed to Gadsden Furnace, Alabama, in 1882.
- Western Furnaces, Knightsville, Clay county. Two stacks, built in 1867 and 1868; torn down in 1879.

CHARCOAL.

- Nelson Furnace, Shoals, Martin county. One stack, built in 1872; has been out of blast since 1880.

ILLINOIS.

BITUMINOUS COAL OR COKE.

Grand Tower Furnaces, Grand Tower, Jackson county. Two stacks, built in 1868; last in blast in March, 1876; both stacks torn down.

MICHIGAN.

CHARCOAL.

Bay Furnaces, Bay Furnace Company, Onota, Schoolcraft county. Two stacks: one built in 1870; the other built in 1872; burned in 1877.

Cliffs Furnace, Negaunee, Marquette county. One stack, built in 1867; abandoned.

Escanaba Furnace, Escanaba, Delta county. Built in 1872-3; machinery removed in 1879 to the Edgar Thomson Steel Works, Pa.

Excelsior Furnace, Carp River Iron Company, Marquette. Furnace at Ishpeming. One stack, built in 1872, rebuilt in 1879; idle for several years.

Lawton Furnace, Michigan Central Iron Company, Lawton, Van Buren county. One stack, built in 1867; not in blast since 1873.

Michigan Iron Company, Clarksburgh, Marquette county. Two stacks: Greenwood, built in 1865; Michigan, built in 1867.

Morgan Iron Company, Morgan, Marquette county. Two stacks: Morgan, built in 1863; Champion, built in 1867, and burned in 1874.

Munising Furnace, Munising, Schoolcraft county. One stack, built in 1867.

Pacific Furnace, Marquette Furnace Company, Marquette, Marquette county. One stack, built in 1868, rebuilt in 1873. Fuel, either charcoal or coke. Not in blast for many years.

WISCONSIN.

CHARCOAL.

Appleton Furnace Company, Appleton, Outagamie county. Two stacks, built in 1871 and 1872; No. 1 burned in 1888, and will not be rebuilt; No. 2 torn down in 1887.

Fox River Furnaces, West Depere, Brown county. Two stacks, one built in 1869, and the other built in 1872; torn down in 1889.

Green Bay Furnace, Green Bay, Brown county. Built in 1870; abandoned in 1888, and dismantled.

Iron Mountain Furnace, North Chicago Rolling Mill Company, Iron Mountain, Dodge county. One stack, built in 1865.

National Furnace, Depere, Brown county. One stack, built in 1872; abandoned.

Richland Furnace, Cazenovia, Richland county. Built in 1876, and torn down in 1879.

MINNESOTA.

CHARCOAL.

Duluth Furnace, Duluth Iron Company, Duluth, St. Louis county. One stack, built in 1872-3, and first put in blast July 12, 1880; abandoned.

MISSOURI.

CHARCOAL.

Hamilton Furnace, Sullivan, Franklin county. One stack, built in 1873.
Iron Mountain Furnaces, in St. Francois county. Two stacks, built in 1846 and 1854; not in blast for several years.

Irondale Furnace, Irondale, Washington county. Built in 1859.

Knotwell Furnace, Newburg, Phelps county. Built in 1873-4.

Maramec Iron Works, in Phelps county. One stack, built in 1826.

Moselle Furnace, Moselle, Franklin county. Built in 1867.

Nova Scotia Furnace, Salem, Dent county. One stack, built in 1880-1; machinery removed to Paducah, Kentucky, in 1888.

Osage Furnace, in Camden county. Built in 1873.

Scotia Iron Furnace, Leesburg, Crawford county. Built in 1870; abandoned in 1879.

COKE.

St. Louis Ore and Steel Company, St. Louis. One stack at South St. Louis, built in 1869; not likely to run again.

South St. Louis Furnaces, St. Louis. Two stacks, built in 1870 and 1872. Not in blast for several years, and to be dismantled.

UTAH TERRITORY.

CHARCOAL.

Iron Manufacturing Company of Utah, Iron City, Iron county. One stack, built in 1873; torn down in 1883.

Ogden Iron Works, Ogden. One stack, begun in 1875 and completed in 1882.

OREGON.

CHARCOAL.

Oswego Furnace, Oswego, Clackamas county. One stack, built in 1866-7, first blown in August 27, 1867, and rebuilt in 1879; abandoned in 1888.

CALIFORNIA.

CHARCOAL.

California Furnace, Hotaling, Placer county. One stack, built in 1879-80, and first blown in April 24, 1881; burned in September, 1882, and rebuilt in 1883; out of blast since 1886, and not likely to run again.

ROLLING MILLS AND STEEL WORKS.

NOTE.—A list of rolling mills and steel works which have been abandoned will be found separately printed after the following list of rolling mills and steel works which are either in operation or standing idle with machinery in good condition. The telegraph address is given only when it is not the same as the post-office address.

MAINE.

Portland Rolling Mill, P. O. Box 1,386, Portland, Cumberland county. Built in 1866; 4 double puddling furnaces, one Siemens and 4 coal heating furnaces, and 3 trains of rolls (one 10 and two 18-inch); product, merchant bar iron, railroad spikes, angle and plain fish-plates, and angle and bridge iron; annual capacity, 13,000 net tons. Brands, "Standard" and "Forest City." C. R. Milliken, President; John W. Leavitt, Secretary and Treasurer; Samuel Peters, Superintendent.

Number of rolling mills in Maine: one.

NEW HAMPSHIRE.

Nashua Iron and Steel Company, Nashua, Hillsborough county. Built in 1848; steel-tire mill added in 1867; 20 heating furnaces, one 10-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, and 11 hammers; machine shop built in 1863, and rebuilt and enlarged in 1872, for manufacturing rolling-mill and steam machinery; product, steel and iron forgings for railroads and machine shops, homogeneous steel and iron plates, steel plates, steel locomotive and car tires, bar steel, bar iron, and hardened-steel-tired car, truck, and tender wheels. Brand, an Indian head. Aretas Blood, Treasurer, Manchester.

Number of rolling mills and open-hearth steel works in New Hampshire: one.

MASSACHUSETTS.

American Steel Car-wheel Company, 4 Post-office Square, Boston. Works, corner First and I sts., South Boston. Bessemer steel plant built in 1888; one 1-gross-ton and one 3-gross-ton converter; first blow made in January, 1889; product, all-steel car-wheels and castings; annual capacity, 2,700 net tons. George H. Burt, President; W. W. Whitcomb, Secretary and Treasurer; W. N. Richards, Superintendent.

Bay State Iron Works, Bay State Iron Company, 12 Pearl st., Boston,

Suffolk county. Works, corner First and I sts., South Boston. Plate mill No. 2 built in 1873; 2 trains of 30-inch rolls, 5 heating furnaces, and one annealing furnace; product, steel plates, rolled for other parties, who furnish the ingots; annual capacity, 8,500 net tons. (Puddle mill built in 1847 and plate mill No. 1 built in 1863 sold and dismantled.) John H. Reed, President and Treasurer; Thornton K. Lothrop, F. Gordon Dexter, E. W. Hooper, and Charles J. Whitmore, Directors.

Bridgewater Iron Company, Bridgewater, Plymouth county. Built in 1785 and 1874; 5 scrap furnaces, 3 heating furnaces, 6 forge fires, 7 trains of rolls, and 2 hammers; product, bar iron, tack plate, sheet zinc and sheet copper, and various kinds of iron and steel forgings; annual product of rolled iron, about 6,000 net tons. Trustees, John E. Sanford, Luke P. Willard, and Arthur E. Denison.

Cambridge Rolling Mills, Gilmore & Eustis, lessees, Cambridgeport, Middlesex county. Built in 1868; burned and rebuilt in 1884; 5 heating furnaces and 3 trains of rolls; product, merchant bar and shafting iron to 2½ inches in diameter, axe iron, rerolled Norway and Swedish shapes, bolt, nail, rivet, and wire rods, scrap wire and rivet rods, scrap rods, scrolls, tires, and horse-shoe iron; annual capacity, 10,000 net tons. Stamp for best refined, "B. R. M." Special stamps are used on other kinds of iron. Formerly called Boston Rolling Mills.

Danvers Iron Works, Arthur G. Tompkins & Co., 10 Oliver st., Boston. Works at Danversport, Essex county. Built in 1831; burned and rebuilt in 1883; 3 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); product, merchant bar iron, bolt iron, scrap rods, and rerolled Norway and Swedish shapes; annual capacity, 5,000 net tons. Brand, "Danvers."

Franconia Iron and Steel Works, James C. Warr, lessee, Wareham, Plymouth county. Built in 1866; 6 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron of all kinds and sizes; specialties, round, square, and flat iron, angles, ovals, half ovals, half rounds, axle and axe iron, and shafting; daily capacity, 30 net tons.

Kinsley Iron and Machine Works, 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; 4 double puddling and 5 heating furnaces, 2 busheling and one scrap furnace, 3 hammers, and 3 trains of rolls (one 8, one 14, and one 19-inch); steam and water power; product, merchant bar iron, shapes, splice bars, track bolts, and railroad supplies; annual capacity, single turn, 6,000 net tons. Brands of bar iron, "Kinsley" and "G. K." A forge is connected with the works for the production of car and locomotive forgings, wagon axles, etc.; also a foundry and a

machine shop. Fred. L. Ames, President ; Edw. R. Eager, Treasurer ; Frank M. Ames, Agent.

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 nail machines, and two 18-inch trains of rolls ; product, nails, tack plate, skelp iron, shovel plate, etc. ; annual capacity, 9,000 net tons. Also operate a machine shop for building nail machines and flax and hemp-dressing machinery. Job M. Leonard, Treasurer ; Henry B. Leonard, Agent.

Robinson Iron Company, Plymouth, Plymouth county. Built about 1800 ; one double puddling furnace, 6 heating furnaces, 2 trains of rolls, and 18 nail machines ; steam and water power ; product, nails and tack plate ; average yearly production, 3,000 net tons. Increase Robinson, President ; James Millar, Treasurer.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. Built about 1820, and rebuilt in 1846 ; Clapp-Griffiths steel plant added in 1887 ; one 3-ton converter operated in connection with the nail works, and for other purposes ; first blow made in December, 1887 ; 5 trains of rolls, (one 24-inch blooming, one 24-inch finishing, two 18-inch nail plate, and one 17-inch tack,) and 173 nail machines ; steam and water power ; annual capacity, 225,000 kegs of cut nails and 10,000 net tons of plates. Horace P. Tobey, Treasurer.

Tyler Steel Tube Company, 131 Devonshire st., Boston. Works at 235 A st., South Boston. Built in 1886, and rolling mill machinery added in 1889 ; one heating furnace, one welding furnace, and 2 trains of rolls ; product, locomotive tubes of best imported steel ; annual capacity, 9,000 net tons. W. P. Tyler, President ; C. P. Sampson, Secretary ; Walter Woodman, Treasurer ; John Fisher, Manager.

Wareham Nail Company, South Wareham, Plymouth county. Built in 1836 ; 4 heating furnaces, 2 trains of rolls, and 35 nail machines ; steam and water power ; product, nails ; annual capacity, 70,000 kegs. Edgar Robinson, owner.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Two mills. Quinsigamond Rolling Mill, built in 1846 ; 13 heating furnaces and 7 trains of rolls ; product, iron and steel screw, rivet, and wire rods. Steel works added in 1885 ; one 12-gross-ton Siemens-Martin open-hearth furnace ; made first steel September 26, 1885. Grove Mill, built in 1868 ; 3 heating furnaces and 2 trains of rolls ; product, patent continuous wire rods of long lengths and small sizes for telegraph and rope wire. Total annual capacity, 60,000 net tons. All rods drawn into wire. Philip L. Moen, President and Treasurer ; Charles F. Washburn, Vice-President and Secretary ; Philip W. Moen, Assistant Treasurer ; Charles G. Washburn, Assistant Secretary and Counsel.

Washburn Car-wheel Company, Hartford, Conn. Steel works at Wor-

cester, erected in 1864; twelve 4-pot steel furnaces, 3 heating furnaces, one train of tire rolls, and one hammer; product, crucible steel car-wheel tires; annual capacity, 1,100 net tons. William M. Barnum, Vice-President; Salisbury Hyde, Secretary and Treasurer.

Worcester Steel Works, (formerly Washburn Iron Company,) P. O. Box 967, Worcester, Worcester county. Built in 1857, and remodeled in 1882 to roll steel rails. Two 4-gross-ton Bessemer converters, built in 1884; first blow made June 2, 1884, and first steel rail June 11, 1884; 4 Siemens heating furnaces, 2 trains of rolls, and one hammer; one 12-gross-ton Siemens-Martin open-hearth steel furnace; first open-hearth steel made March 25, 1885; merchant mill, with one 12-inch and one 20-inch train of rolls, added in 1888; product, Bessemer steel rails, wire billets, fish-plates, and merchant steel of all sizes. The company has also a plant for making steel forgings. George M. Rice, President; M. J. P. McCafferty, Secretary; Edwin Gleason, Treasurer; Henry Grey, General Superintendent.

Number of rolling mills and steel works in Massachusetts: 16. Of these 2 make Bessemer steel, one makes Clapp-Griffiths steel, 2 make open-hearth steel, and one makes crucible steel.

RHODE ISLAND.

Rhode Island Horse Shoe Works, Rhode Island Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Built in 1867, and rebuilt in 1874; totally destroyed by fire January 7, 1887, and rebuilt and running in full June 1, 1887; 7 scrap and 6 heating furnaces, 9 trains of rolls, (six 8 and three 18-inch.) and 24 horse-shoe machines; product, bars for the horse-shoe machines, and toe calks; annual capacity, single turn, 17,500 net tons. Brands, "Perkins' United States Standard Horse and Mule Shoes" and "Perkins' Patent Toe Calks." F. W. Carpenter, President; C. H. Perkins, General Manager; R. W. Comstock, Secretary.

Number of rolling mills in Rhode Island: one.

CONNECTICUT.

Ætna Nut Company, Southington, Hartford county. Built in 1872-3; 2 single puddling furnaces, 4 scrap and busheling furnaces, 3 heating furnaces, and 3 trains of rolls; product, squares, rounds, nut shapes, bolt rods, and butt iron; annual capacity, 3,000 net tons. R. A. Neal, President; Benjamin S. Porter, Secretary; George B. Finch, Treasurer.

Bridgeport Rolling Mill Company, Bridgeport, Fairfield county. Built in 1887; one 12-inch train of rolls for rolling merchant steel. Benj. Fletcher, Jr., President; Howard F. Martin, Secretary; Edward A. King, Treasurer; Albert H. Stanton, General Manager.

Cold Spring Iron Works, Mitchell Brothers, Norwich, New London county. Built in 1845; 4 heating furnaces and two trains of rolls (one 9 and one 20-inch); product, ovals, half ovals, half rounds, rods, grooves, and scrolls; annual capacity, 2,200 net tons.

Collins Company, Collinsville, Hartford county. Established in 1826. 2 scrap furnaces, 8 heating furnaces, one 12-inch and one 18-inch train of rolls, 2 hammers, two 20-ton steel cementing furnaces, and 30 steel-melting holes; 180 pots can be used at each turn in steel works; water and steam power; product, bar iron and cast steel, consumed wholly in these works in the production of "Collins" edge tools, steel plows, etc.; annual capacity of finished iron, 2,500 net tons, and of steel, 750 net tons. Edward H. Sears, President; Meigs H. Whaples, Secretary and Treasurer; Charles H. Blair, Superintendent. Treasurer's and transfer office, Hartford. General selling agents, Collins & Co., 212 Water st., New York.

Farist (The) Steel Company, Bridgeport, Fairfield county. Built in 1868; enlarged since; 2 single puddling and 4 heating furnaces, 2 trains of rolls, (12 and 15-inch,) 6 hammers, one 24-pot Siemens gas steel-melting furnace, and 18 four-pot steel-melting holes; product, crucible steel, rolled and hammered; also reroll and hammer open-hearth steel billets; annual capacity, 2,000 net tons. Added in 1883 a spring shop, containing machinery for the manufacture of spiral springs and elliptic railroad springs. Joel Farist, President; George Windsor, Secretary and Treasurer.

New Haven Rolling Mill, New Haven Rolling Mill Company, New Haven. Completed in August, 1871; 10 charcoal forge fires, 6 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and one hammer; use only scrap iron; product, small nut and bolt rods and refined and charcoal wire rods; annual capacity, 5,000 net tons. Works contain one gas furnace. E. S. Wheeler, Secretary; Pierce N. Welch, Treasurer; C. S. Poronto, Superintendent.

Thames Iron Works, Norwich, New London county. Built in 1863; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (10 and 18-inch); product, merchant bar iron and spike rods; annual capacity, 3,000 net tons. John Mitchell, President; James Greenwood, Secretary and Treasurer; Charles Mitchell, Superintendent.

Windsor Locks Steel Company, Bridgeport. Works at Windsor Locks, Hartford county. Built in 1860; 6 heating furnaces, 3 trains of rolls, and ten 4-pot steel-melting holes; water-power; product, rolled and hammered crucible steel and rolled Siemens-Martin and Bessemer steel; annual capacity, 3,000 net tons. Charles J. Goodwin, President, Indian Orchard, Mass.; W. Kennon Jewett, Secretary and Treasurer, Bridgeport.

Number of rolling mills and steel works in Connecticut: 8. Of these 3 make crucible steel and one makes blister steel.

NEW YORK.

Auburn Iron Works, C. W. Tuttle & Co., Auburn, Cayuga county. Built in 1853; one heating furnace, one 9-inch train of rolls, and one hammer; use scrap iron only; product, merchant bar and horse-shoe iron; annual capacity, 2,300 net tons. Brand, "Auburn."

Ausable Horse Nail Works, Ausable Horse Nail Company, Keeseville, Clinton county. Built in 1869; 2 heating furnaces, one train of rolls, and one hammer; water-power; product, nail rods, all worked into horse nails by this company; annual capacity, 2,000 net tons. Abraham Bussing, President; Daniel Dodge, Vice-President; J. R. Romeyn and Abraham Bussing, Secretaries; Edmund K. Baber, Treasurer and Manager. Sole agent, Abraham Bussing, 4 Warren st., New York. Idle.

Burden Iron Works, The Burden Iron Company, Troy, Rensselaer county. Founded in 1813; 35 double and 30 single puddling furnaces, 13 heating furnaces, and 13 trains of rolls; steam and water power; product, bar and other merchant iron, horse shoes, and boiler rivets; specialties, Burden's horse shoes and boiler rivets; annual capacity, 50,000 net tons. Brands of merchant iron, "H. B. & S." and "Burden Best." James A. Burden, President; John L. Arts, General Manager; Nicholas J. Gable, Secretary. *See Furnaces.*

Chrome Steel Works, corner Kent avenue and Keap st., Brooklyn, Kings county. Built in 1869; 7 heating furnaces, 7 hammers, 9 steel-melting holes, and 2 trains of rolls (one 12 and one 18-inch); 54 pots can be used at each heat in 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; annual capacity, 2,500 net tons. S. H. Kohn, President; C. P. Haughian, Vice-President; J. G. Dunscomb, Secretary.

Cohoes Rolling Mill, Morrison, Colwell & Page, 253 River st., Troy. Works at Cohoes, Albany county. Built in 1864; burned and rebuilt in 1883; 12 double puddling furnaces, 3 scrap and 5 Swindell gas heating furnaces, and 4 trains of rolls; water-power; product, band iron, bar iron, and patent punched axe-polls; specialty, high-grade iron for edge tools, butts, and hinges; annual capacity, 9,000 net tons.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Mill built originally as a rail mill in 1860; puddle mill built in 1868; rail mill converted into puddle mill in 1883; 24 single and 2 double puddling furnaces, one hammer, and 2 18-inch trains of rolls. Bar mill erected in 1864; 4 heating furnaces and 3 trains of rolls (one 9, one 12, and one 18-inch.) Universal mill, built in 1884 to roll plates from 6 to 30 inches wide and of any thickness, has 2 Siemens heating furnaces, 9 x 12 feet, with a daily capacity

- of 20 tons. Annual capacity, 20,000 net tons of bar, angle, plate, and band iron. Brand, "Elmira." Adding a 3-high train for rolling 6 x 4 inch and 6 x 6 inch angles. H. W. Rathbone, President and General Superintendent; J. B. Rathbone, Vice-President; Jesse L. Cooley, Secretary and Treasurer; William Clark, Manager. *See Furnaces.*
- Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Crucible steel plant erected in 1880; four 5-pot steel-melting holes; annual capacity, 200 net tons of crucible steel castings. Open-hearth steel plant erected in 1882; one 8-gross-ton open-hearth steel furnace; annual capacity, 2,000 net tons of open-hearth steel castings.
- Manhattan Rolling Mill, John Leonard, 451 West st., New York City. Built in 1881; 2 heating furnaces and 2 trains of rolls (one 8 and one 18-inch); product, horse-shoe iron and small flats; annual capacity, 2,000 net tons of horse-shoe iron and 600 net tons of flats. Brand, "J. L. H. S. Iron." E. B. Edwards, Manager.
- Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Built in 1862-3; 48 two-pot steel-melting holes, 4 heating furnaces, one train of rolls, and one hammer; product, saw steel; annual capacity, 2,500 net tons. George N. Clemson, President; R. W. Clemson, Secretary; Charles I. Humphrey, Treasurer.
- Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse, Onondaga county. Built in 1864; 11 heating furnaces, 6 hammers, (from 200 to 2,000 pounds each,) 5 trains of rolls, (two 9, one 10, and two 12-inch,) and 5 steel-cementing furnaces; use Sweet's patent gas furnaces, burning fine coal; manipulators of old Bessemer steel rails and locomotive tires, and converters of iron into blister steel; product, bar steel, steel crow-bars, seat springs, tire and spring steel, and steel for various other purposes; annual capacity, 10,000 net tons. Special products, "Sweet's Excelsior" tire steel, "Sweet's" seat springs, "Sweet's" steel crow-bars, and "Favorite" toe-calk steel. William A. Sweet, President and Manager; Matthew Cunningham, Secretary; A. A. Sweet, Treasurer; Peter Eckel, Superintendent. Agents, Parkhurst & Wilkinson, Chicago.
- Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 3 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one hammer; use scrap iron and steel billets; product, merchant bar of all sizes and shapes, used by the firm in the manufacture of agricultural machinery; annual capacity, 4,500 net tons. T. M. Osborne, President; J. H. Osborne, Secretary; G. W. Allen, Treasurer.
- Phoenix Horse Shoe Company, Poughkeepsie. New York office, 20 Reade st. Built in 1873; 6 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; specialty, horse shoes; annual capacity, 8,000 net tons. Charles Miller, President and Manager; Charles H. Holton, Secretary and Treasurer.

Ramel-Conley Iron and Steel Company, 290 Broadway, New York. Works at Brewster, Putnam county. Built in 1888-9; 12 retorts and one 10-gross-ton open-hearth steel furnace; retorts used for reducing ore by the Conley direct process, and the product used as a raw material for producing open-hearth steel. Emile Ramel, President; John Williams, Secretary; Edmond Huerstel, Treasurer; M. R. Conley, General Superintendent.

Rome Merchant-Iron Mill, Rome, Oneida county. Built in 1869; 8 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best grades of merchant bar, stay-bolt horse-shoe, snow-ball horse-shoe, hexagon and beveled-edge tire, scroll, hoop, and band iron, branded "Rome," and a superior quality branded "J. G.;" annual capacity, 12,000 net tons. Jim Stevens, President; S. B. Stevens, Vice-President; Charles W. Lee, Secretary and Treasurer; Samuel Southall, Superintendent.

Sable Iron Works, J. and J. Rogers Iron Company, Ausable Forks, Essex county. Built in 1834; operated in connection with a forge; 2 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); water-power; product, bars for conversion into cast steel, Peru horse-shoe iron, and round and square iron; annual capacity, 7,000 net tons. Brands, "Peru Iron," "Rogers," or R in a circle. H. D. Graves, President; H. W. Stetson, Vice-President; Benjamin E. Wells, Secretary. *See Forges.*

Sanderson Brothers Steel Company, Syracuse, Onondaga county. Established in 1876; 10 heating furnaces, 3 forge fires, 4 annealing furnaces, 2 steel cementing furnaces, 9 hammers, 3 trains of rolls, (9, 10, and 12-inch,) and one 16-pot and four 12-pot Siemens steel-melting furnaces; product, hammered and rolled crucible steel of every description, shear steel, and blister steel; specialty, the finest quality of tool steel; annual capacity, 3,000 net tons. Brand, "Sanderson Bros. & Co." C. H. Halcomb, President and General Manager; W. F. Belknap, Secretary.

Spuyten Duyvil Rolling Mill, Welch & Barnum, Spuyten Duyvil, New York City. Main office, 11 Pine st., New York City. Rail mill built in 1863; 4 double puddling and 10 heating furnaces and 2 trains of 3-high 18-inch rolls. Bar and guide mill added in 1872; 3 heating furnaces and 2 trains of rolls (one 9 and one 16-inch). Product, rails, fish-plates, and all sizes of merchant and guide mill iron; annual capacity, 20,000 net tons. J. T. Lewis, Superintendent. Idle since 1883.

Syracuse Iron Works, Syracuse, Onondaga county. Built in 1861; 5 double and 2 double-double puddling furnaces, 6 heating furnaces, 3 trains of rolls, (one 8, one 9, and one 19-inch,) and 2 hammers; product, best grades of merchant bar, wire-rod, band, and hoop iron, rail-road and boat spikes, fish bolts, horse-shoe and bridge iron, horse

shoes, and cotton-ties; annual capacity, 10,000 net tons. Charles E. Hubbell, Receiver. The works are idle and for sale.

Syracuse Steel Foundry Company, Syracuse, Onondaga county. Built in 1886, and first castings made in November; enlarged in 1887; two 16-pot Sweet's gas steel-melting furnaces; product, crucible steel castings; annual capacity, 675 net tons. Fred. Frazer, President; George P. Hier, Vice-President; R. W. Jones, Secretary; George S. Hier, Treasurer.

Troy Steel and Iron Company, Troy, Rensselaer county. New York office, 26 Broadway. Property formerly owned by the Albany and Rensselaer Iron and Steel Company. Albany Iron Works, established in 1819; 7 double and 14 single puddling furnaces, 23 heating furnaces, 7 trains of rolls, 4 steam and 2 trip hammers, and 2 bolt, 8 rivet, and 2 nut machines; steam and water power; product, bars, car axles, bands, hoops, finger-bars, crow-bars, fish-plates, bolts and nuts, and boiler rivets; annual capacity, 37,000 net tons. Brands of iron, "A. I. W.," "Corning's Best Best," and "Troy." Rensselaer Iron Works, established in 1846; three-high steel rail mill and merchant mill built in 1866 and 1867; first steel rail rolled in 1866; new merchant mill built in 1877 and 1878; 23 heating furnaces, 5 trains of rolls, and 2 steam and 2 trip hammers; product, steel rails, steel shapes and sheets, and special and agricultural steels; annual capacity of rail mill, 120,000 net tons; capacity of merchant mill, 25,000 tons. Brands of steel, "XX Gun," "XX Special Dead Soft," and "XX Gun Barrel," besides a variety of other special grades. Bessemer steel works were built in 1864; first blow made February 16, 1865; 2 converters, each of 10 gross tons' capacity, 4 cupolas, and 4 spiegel cupolas; annual capacity, 300,000 net tons ingots; blooming department contains 5 heating furnaces and an adjustable train of 31½-inch rolls; capacity to roll full product of converting department; steam-power, with auxiliary water-wheel. Henry H. Rogers, President; William Kemp, Vice-President; Selden E. Marvin, Secretary and Treasurer; George A. Bell, Auditor and Acting General Superintendent. *See Furnaces.*

Westerman Rolling Mill, Westerman & Co., Lockport, Niagara county. Built in 1870; 4 heating furnaces and 2 trains of rolls; water-power; product, hoops, bands, wire rods, horse-shoe iron, rounds, squares, hexagons, and fancy shapes of all kinds; annual capacity, 4,000 net tons.

William W. Wood, Wood's Falls, Clinton county. Rolling mill built in 1879-80; one 10-inch train of rolls, operated in connection with a forge; product, car axles and bar iron. *See Forges.*

Number of rolling mills and steel works in New York: 23. Of these one makes Bessemer steel, 2 make open-hearth steel, 5 make crucible steel, and 2 make blister steel.

NEW JERSEY.

American Sheet Iron Works, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1867; enlarged in 1870, 1873, and 1882; 3 double puddling furnaces, 2 heating furnaces, 3 sheet-finishing furnaces, 3 annealing furnaces, 3 forge fires, 5 trains of 22-inch rolls, and one hammer; product, best qualities of sheet iron; annual capacity, 3,000 net tons. Brand, "American R. G." Joseph C. Kent, President; George Danby, Secretary and Treasurer; William Boofman, Superintendent. *See Bloomaries.*

Boonton Iron Works, Boonton, Morris county. Estate of J. Couper Lord, owner, 68 Wall st., New York. Built originally in 1825; extended since; 12 double puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 20 nail machines; steam and water power. The rolling mill is leased by the Boonton Iron and Steel Company; product, horse-shoe and tire iron; annual capacity, 4,000 net tons. The nail factory is leased by Patterson & Anthony, who make small nails for Fuller Brothers & Co., 139 Greenwich st., New York, from nail plate furnished by the latter. *See Furnaces.*

Columbia Rolling Mill Company, 781-785 Jersey avenue and 266-270 Fourteenth st., Jersey City. Built in 1888-9; 6 heating, 4 annealing, and 2 smelting furnaces, and 4 trains of rolls; product, taggers iron from tin scrap, after the tin is removed. Jesse Larrabee, President; W. L. Brockway, Vice-President and General Manager; W. A. Crawford, Secretary; G. W. Knight, Treasurer.

Cumberland Nail and Iron Company, Bridgeton, Cumberland county. Branch office, 43 North Water st., Philadelphia. Built in 1814; 10 double puddling furnaces, 4 heating furnaces, two 18-inch trains of rolls, and 90 nail machines; steam and water power; product, nails and gas tubes; annual capacity, 140,000 kegs of cut nails and 3,000 net tons of gas tubes. Robert J. Buck, President; Chester J. Buck, Vice-President; John M. Reeves, Secretary and Treasurer, 43 North Water st., Philadelphia.

Delaware Rolling Mill, F. P. Howe, Phillipsburg, Warren county. Built in 1865; 6 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (one 8-inch guide, one 16-inch puddle, and one 18-inch bar); product, flats, rounds, squares, small angles, and a superior grade of muck bar; daily capacity, 50 to 60 net tons. A. L. Howe, Manager.

Dover Iron Works, Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770, and rebuilt several times since; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); steam and water power; product, merchant bar, boiler rivets, socket bolts, and brace jaws; annual capacity, 5,000 net tons. Brand of merchant bar, "Dover;" brand of rivets, "D." This company also manufactures "Ulster" iron for C. R. Mulligan. George

- Richards, President; H. W. Crabbe, Secretary and Treasurer. Represented in New York by Fuller Brothers & Co., 139 Greenwich st.
- Harvey Steel Company, Brills Station, Newark, Essex county. Built in 1889; 5 heating furnaces, one 10-inch train of rolls, three hammers, (one 700-lb., one 1,000-lb., and one 1,800-lb.,) two 4-pot steel melting holes, and 14 treating furnaces; product, finished forms and forgings made from high-grade steel; also treat low-grade steel; annual capacity, 3,000 net tons. Brand, "Excelsior." H. A. Harvey, President; Theodore Sturges, Secretary and Treasurer; Joseph H. Dickinson, Manager. Selling agent, W. G. Halsey.
- Heller & Brothers, Newark, Essex county. Crucible steel works, built in 1882; 24 two-pot steel-melting holes; product, crucible steel, used by the firm in the manufacture of tools, rasps, and files; annual capacity, 1,000 net tons.
- Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City, Hudson county. Built in 1850; 2 heating furnaces, 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, 8,500 net tons.
- Jersey City Steel Works, Benjamin Atha & Co., lessees, Jersey City. Main office, Newark. Commenced operations August 1, 1862; 2 single and 2 double puddling furnaces, 22 heating furnaces, 5 trains of rolls, (two 9, one 12, one 16, and one 18-inch,) 12 steam hammers, and 80 four-pot steel-melting holes; product, cast steel solely; annual capacity, 14,000 net tons. *See Newark Steel Works.*
- John A. Roebling's Sons Company, Trenton. Established in 1852; rolling mill rebuilt in 1873, and again in 1887; 8 charcoal forge fires, 5 heating furnaces, 4 trains of rolls, and one 3-ton steam hammer; product, iron, steel, and copper wire and wire rope; annual capacity of wire works, 25,000 net tons; annual capacity of rolling mill, 20,000 net tons of rods. Also operates the New Jersey Wire Cloth Company's works. Charles G. Roebling, President; F. W. Roebling, Secretary and Treasurer.
- New Jersey Steel Works, John Illingworth & Co., (incorporated,) Harrison, Hudson county. Built in 1888-9, and put in operation in April, 1889; 6 forge fires, 6 heating furnaces, 4 trains of rolls, (8, 9, 12, and 16-inch,) 5 hammers, (300-lb., 600-lb., 1,000-lb., 1,700-lb., and 2,500-lb.,) and five 6-pot steel-melting holes; product, tool, die, spring, and cutlery steel, and open-hearth steel merchant bars; annual capacity of crucible steel ingots, 2,800 net tons, of rolled and hammered steel, 10,000 net tons. Fuel used, coal and petroleum. John Illingworth, President and Manager; Edward Spaeth, Vice-President; Abram C. Denman, Secretary; Samuel S. Dennis, Treasurer.
- Newark Steel Works, Benjamin Atha & Co., Newark, Essex county. Began business in 1864; one double puddling furnace, two 30-pot Sie-

- mens melting furnaces, one 7-gross-ton Siemens open-hearth steel furnace, 12 hammers, and 5 trains of rolls (two 8, one 9, one 12, and one 16-inch); product, every kind of cast steel, except sheet; annual capacity, 14,000 net tons. Brand, "Newark." *See Jersey City Steel Works.*
- Oxford Iron and Nail Company, Oxford, Warren county. New York office, 52 Wall st. Built in 1866; 26 puddling furnaces, 5 heating furnaces, 4 spike furnaces, 103 nail machines, and 4 trains of rolls (one 10, one 12, and two 23-inch); product, nails; annual capacity, 300,000 kegs. Theodore Sturges, President; John I. Blair, Vice-President; Charles E. Sturges, Treasurer; Edmund T. Lukens, Secretary and General Manager, at the works. Sales agent, J. S. Scranton, 83 Washington st., New York. *See Furnaces.*
- Passaic Rolling Mills, Passaic Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Built in 1867, and incorporated in 1869; 8 double puddling furnaces, 7 gas heating furnaces, 5 trains of rolls, (one 9, one 18, one 20, and one 26-inch, and one 30-inch universal,) and 3 hammers; product, beams, channels, angles, tees, and other shapes for buildings and bridges, merchant bars, rivets, nuts, etc.; annual capacity, 20,000 net tons. Specialty, shapes. Brand, "Passaic." Building an open-hearth steel plant to contain two 20-ton furnaces, with blooming mill and other machinery for making structural steel. Watts Cooke, President; W. O. Fayerweather, Vice-President and Treasurer; A. C. Fairchild, Secretary; John K. Cooke, Superintendent. The company also builds bridges; annual capacity of bridge shop, 15,000 net tons.
- Paterson Iron Company, Paterson, Passaic county. Works burned and rebuilt in 1887; one train of two-high 96-inch plate rolls and several hammers; product, plates and heavy forgings. Charles D. Beckwith, President and Treasurer; James Johnston, Superintendent.
- Pompton Steel and Iron Company, Pompton, Passaic county. Built in 1863; 5 single puddling furnaces, 6 heating furnaces, 42 crucible steel-melting furnaces, 2 trains of rolls, and 5 hammers; water and steam power; 160 pots can be used at each heat in steel works; product, crucible cast steel and railway car springs; annual capacity, 3,000 net tons. James Ludlum, President and Treasurer; Richard Wright, Secretary; Joseph W. McElroy, Superintendent.
- Rockaway Rolling Mill, D. T. Warren, Rockaway, Morris county. Office, 32 Warren st., New York. First put in operation in May, 1886; 3 single puddling furnaces, one Wilson deoxidizer, one 20-inch train of rolls, and one hammer; steam and water power; product, blooms for steel purposes, from ore. Idle and for sale. *See Forges.*
- Trenton Iron Company, Trenton, Mercer county. Built in 1845; 11 forge fires, 2 double puddling furnaces, 6 heating furnaces, 2 hammers, (one 2½ and one 3-ton,) and 4 trains of rolls (one 8, one 10, one 12, and one 20-inch); wire works, with 965 blocks; product, wire rods,

merchant rods, iron and steel wire, wire rope, and wire rope tramways (Bleichert system) for transportation of material; annual capacity of rods, 18,000 net tons. Abram S. Hewitt, President; William Hewitt, Vice-President; E. Gybbon Spilsbury, Managing Director; James Hall, Treasurer; E. Hanson, Secretary. New York office, Cooper, Hewitt & Co., 17 Burling Slip.

Trenton Iron Works, New Jersey Steel and Iron Company, Trenton, Mercer county. Built in 1845; 12 double puddling and 13 heating furnaces, 7 trains of rolls, (one 8, one 12, one 19, two 20, and two 26-inch,) and one 3-ton hammer; product, beams, channels, angles, tees, and other shapes, and merchant bars; also, bridges and chains of all sizes; annual capacity, 25,000 net tons. Specialty, shapes. Brand, "Trenton." Edward Cooper, President, and Edwin F. Bedell, Secretary, New York; Frederick J. Slade, Treasurer, and Joseph Stokes, Superintendent, Trenton. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City, Hudson county. Telegraph address, West Bergen. Built in 1880; 20 heating furnaces, 5 trains of rolls, (one 9, one 10, two 12, and one 18-inch,) 5 hammers, and 24 four-pot steel-melting holes; product, crucible cast steel; also, reroll Bessemer and open-hearth steel billets; annual capacity, 5,000 net tons.

Number of rolling mills and steel works in New Jersey: 21. Of these one makes open-hearth steel, 7 make crucible steel, and one is building an open-hearth steel plant.

PENNSYLVANIA.

PHILADELPHIA AND VICINITY.

Bates Steel Company, 705 Walnut st., Philadelphia. Works at Twenty-third and Filbert sts. Built in 1889; one converting furnace for demonstrating the Bates process of converting cast and wrought iron and low-grade Bessemer steel into high-grade steel. J. F. Bickel, President; Louis Wiener, Vice-President; Isaac L. Miller, Secretary and Treasurer; F. G. Bates, Manager.

Fair Hill Forge and Rolling Mill, Gaulbert, McFadden & Caskey, York and America sts., Philadelphia. Built in 1854; 2 single and 2 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 10,000 net tons. Ishmael James, Superintendent.

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot 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, 482 net tons.

Frankford Steel Company, Frankford, Philadelphia. Built in 1865; 5 heating furnaces, 5 hammers, (600 pounds to 2 tons,) 7 forge fires, and 20 two-pot steel-melting holes; product, steel axles, locomotive and general steel forgings, and tool steel; annual capacity, 500 net tons. Adam Tindel, proprietor.

Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Two works in Kensington, Philadelphia. Delaware Rolling Mills, at Richmond and Otis sts. Built in 1870; 10 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls. Philadelphia Rolling Mill, at Beach and Vienna sts. Built in 1858; 8 double puddling furnaces, one busheling furnace, 5 heating furnaces, and 4 trains of rolls (two 9, one 17, and one 22-inch). Product, bar iron specialties, plates, skelp, bands, hoops, and rods; total annual capacity, 27,000 net tons. Brands, "H. & P. Best," "H. & P. Best-Best," and "H. & P. Stay-bolt." See *Schuylkill Valley Furnaces*.

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Built in 1845; 9 double puddling furnaces, one scrap and 7 heating furnaces, 6 trains of rolls, and 41 nail machines; product, nails, merchant bar, band, hoop, and skelp iron, angle iron from $\frac{3}{4}$ inch to 2 inches in size, and steel plow, cultivator, and shovel plate; annual capacity, 11,000 net tons. Brand, "Anvil."

Keystone Horse Shoe Company, Seventeenth and Clearfield sts., Philadelphia. Mill first put in operation January 1, 1873, rebuilt in 1884; 4 heating furnaces and 3 trains of rolls; trains arranged to make the rolling partly continuous; product, merchant bar, band, hoop, and skelp iron; annual capacity, 15,000 tons. George H. Boker, President; William Gerhard, Secretary and Treasurer; W. G. Howell, Superintendent.

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. The manufacture of saws started in 1840, and the manufacture of steel in 1854; one 30-pot and three 24-pot Siemens steel-melting furnaces; first rolling mill built in 1866; 3 forge fires, 4 trains of rolls, (two 16-inch sheet, one 20-inch sheet, and one 28-inch plate,) 12 coal and 2 gas (Loomis water gas) heating furnaces, and 2 hammers (one 2-ton and one 1,200-lb.); product, principally saw steel of every description, engravers' plates, and sheet steel for all other purposes; annual capacity, 6,025 net tons. The works have also an 18-inch and 9-inch train for band saws; product, bar steel of all kinds; annual bar and rod rolling capacity, 3,000 net tons. The steel works were originally built in Philadelphia, and were removed to Tacony in 1879, 1881, 1883, and 1884. Brand, "Disston." Horace C. Disston, President; William Disston, Vice-President; Hamilton Disston, 2d Vice-President; Jacob S. Disston, Treasurer; Robert J. Johnson, Secretary; Samuel Disston, Agent.

Midvale Steel Company, Nicetown, Philadelphia. Built in 1866; one 10 and two 15-gross ton Siemens open-hearth steel furnaces, 12 four-pot steel-melting coal fires, 20 bituminous and 8 anthracite gas producer fires, 12 coal and 6 gas heating furnaces, 9 hammers, (from 300 pounds to 9 tons,) three tire mills, with monthly capacity of 9,000 tires, and 2 trains of rolls (one 12 and one 23-inch). A well-equipped machine shop attached, as well as blacksmith, moulding, and annealing shops. Several heavy lathes, for boring and turning, and planers will be added to the machine shop. Erecting one 35-ton steam hammer, with 60-ton traveling crane and 60-ton hydraulic gantry, furnaces, etc.; also a steel-casting plant, including moulding shop, drying ovens, a cupola for iron melting, and an oil-tempering plant, with annealing furnaces, for ordnance purposes. Product, open-hearth and crucible steel, consisting of locomotive tires, axles, miscellaneous forgings, and castings; tool, file, spring, machinery, and frog steel, and rolled steel shapes; also forgings and castings for ordnance purposes. Special attention paid to forgings and castings required to stand severe physical tests. Annual capacity, 25,000 net tons. C. J. Harrah, President; C. J. Harrah, Jr., Vice-President and General Manager; J. C. Dessalet, Treasurer; C. Leon Gumpert, Secretary; Axel E. Petre, Superintendent; F. W. Taylor, Engineer.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1842 on Frankford creek; began to make steel in 1845; removed to present location, 2 miles distant, in 1849; 5 heating furnaces, 3 trains of rolls, (one 12, one 14, and one 16-inch,) 2 hammers, 2 cementing furnaces using coal, and 24 two-pot crucible steel-melting furnaces; convert Swedish iron into steel, reroll Norway iron, slit Norway nail rods, roll purchased Bessemer and Siemens-Martin steel, and make elliptic springs, sheet cast steel, cast spring steel, machinery and plow steel, and tire and sleigh steel; annual capacity, 4,500 net tons.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; one single and 16 double puddling furnaces, 17 heating furnaces, and 5 trains of rolls (one 12, one 18, two 20, and one 23-inch); product, all shapes in either iron or steel, channel bars from 2 to 15 inches, beams from 3 to 15 inches, deck beams from 5 to 12 inches, tees from 1 to 5 inches, angles from 1 to 7 inches, flats from 1 to 12 inches wide, rounds from $\frac{1}{2}$ to 7 inches in diameter, hammered and rolled axles, bar and bridge iron, and shafting; the forge has 4 hammers (two 2-ton, one 3-ton, and one 20-ton); annual capacity, 35,000 net tons. Specialties, structural shapes, axles, shafting, slot rail for cable roads, and bridge iron. Brand, "Pencoyd." Steel converting department contains two 15-gross-ton open-hearth steel furnaces, built in 1887. Bridge and construction department contains equipments

for all classes of bridge and architectural work; also standard wrought-iron turn-tables; annual capacity of bridge plant, 20,000 net tons.

Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Works at 1215 Beach st. Built in 1856; 9 single puddling furnaces, 6 heating furnaces, and 4 trains of sheet rolls and 2 trains of plate rolls; product, plate and sheet iron; annual capacity, 11,500 net tons. Brands, "Penn Treaty" and "Keystone" for sheets and "M. B." for plates.

Winch's Rolling Mill, Spike, and Bolt Works, Corydon Winch, Canal st. and Germantown avenue, Philadelphia. Built in 1874; one heating furnace, one train of rolls, and 5 spike machines; product, small fish-plates, bolts, nuts, and spikes; annual capacity, 1,500 net tons.

Number of rolling mills and steel works in Philadelphia and vicinity:
14. Of these works 2 make open-hearth steel, 5 make crucible steel, one makes blister steel, and one makes special steel.

EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

Allentown (The) Rolling Mills, 237 South Third street, Philadelphia. Works at Allentown, Lehigh county. Built in 1860; 2 single and 23 double puddling furnaces, 12 heating furnaces, and 8 trains of rolls; product, iron I beams, channels, angles, merchant bars, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars; annual capacity, 20,000 net tons. J. R. Fell, President; H. W. Allison, Secretary and Treasurer. *See Glen Iron Works. See Lehigh Valley Furnaces.*

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Established in 1860. Rolling mills started in 1863; one single, 4 double, and 3 double-double puddling furnaces, 18 heating furnaces, 45 gas producers, 9 trains of rolls, (10, 12, 15, 21, 22, 25, 28, 32, and 48-inch,) and 7 hammers, ranging from 1,500 pounds to 10 tons each; product, iron and steel rails, billets, beams, tees, angles, heavy plates, puddled bars, merchant iron and steel, etc.; annual capacity of rails, 225,000 net tons; merchant forms, 60,000 net tons. Bessemer steel works started in 1873; four 7-gross-ton Bessemer steel converters; first blow made October 4, 1873; first steel rail rolled October 18, 1873; 8 iron cupolas and 4 spiegel cupolas; 4 soaking pits; product, ingots for rails, etc., and castings; annual capacity in ingots, 275,000 net tons. Siemens-Martin open-hearth steel department started August 11, 1888; two completed furnaces (one 10-gross-ton and one 20-gross-ton) and two 30-gross-ton furnaces in course of construction; oil tempering plant, two hydraulic forging presses, and a plant for the fluid compression of steel; product, heavy hollow and other forgings for crank and other shafting, guns, armor, shields, conning towers, machine parts, billets of special low phosphorus steel, and fluid com-

pressed steel. Pernot open-hearth steel plant in advanced stage of construction, consisting of two 15-gross-ton furnaces, one 15-gross-ton preheating furnace, 2 hydraulic hoists, cranes, etc. Machine shop, blacksmith shop, and foundry connected with the works. Use petroleum for fuel in bloom and rail mill departments. Erecting one 125-ton steam hammer. Contracts have been awarded to this company by the United States Government for the manufacture of about 3,700 tons of gun forgings and about 6,700 tons of armor plates, etc. The company is also furnishing the ship and engine builders of the country with shafting and heavy forgings for the new cruisers. Buildings, furnaces, and other necessary appliances and machinery have been erected to supply the requirements of the Government and ship and engine builders. Robert H. Sayre, General Manager; William W. Thurston, President; Robert P. Linderman, Vice-President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; John Fritz, Chief Engineer and General Superintendent; R. W. Davenport, Assistant Superintendent. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 2 single and 11 double puddling furnaces, 2 scrap and 4 heating furnaces, 118 nail machines, and 2 trains of rolls; steam and water power; product, nails; annual capacity, 250,000 kegs. Brand, "Anchor." Bessemer department contains two small tilting converters; first blow made September 21, 1885; annual capacity, 20,000 net tons of ingots. George Brooke, President; R. T. Leaf, Secretary; George W. Harrison, Treasurer; Elisha Brown, Superintendent. *See Schuylkill Valley Furnaces.*

Blandon Rolling Mill Company Limited, Blandon, Berks county. New York office, 112 John st. Built in 1867, and enlarged and improved in 1880 and 1887; 10 single puddling furnaces, 3 heating furnaces, rotary squeezers, and 3 trains of rolls; product, merchant bars, horse-shoe iron, and hoop, band, and skelp iron; specialty, small shapes; annual capacity, 10,000 net tons. Also roll all sizes and kinds of soft steel. H. Y. Kaufman, Chairman, Reading, Pa.; Wm. P. Tilton, Secretary, and Frank L. Froment, Treasurer, New York.

Brandywine Rolling Mills, Worth Brothers, Coatesville, Chester county. Built in 1881-2, and put in operation in February, 1882; 3 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (20 and 28-inch). Commenced rolling steel in January, 1885, and have constantly increased this branch; product, steel and iron plates, for best boiler and locomotive work, and muck bar; annual capacity, 12,000 net tons of plates. *See Viaduct Iron Works.*

Bristol Rolling Mill, Bristol Rolling Mill Company, Bristol, Bucks county. Built in 1875-6; 2 puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 18-inch); product, bar, band, hoop, and scroll iron; annual capacity, 10,000 net tons of finished

iron. Brand, "Bristol." Charles E. Scheide, President; Gifford V. Lewis, Secretary and Treasurer.

Bryden Horse Shoe Company, Catasauqua, Lehigh county. Building one heating furnace and one 9-inch train of rolls to roll horse-shoe bars from purchased muck bar.

Carpenter Steel Company, Reading, Berks county. Main office, Bo-reel Building, New York. Leased for a portion of the year 1889 a part of the Philadelphia and Reading Rolling Mill building and erected a crucible steel plant, containing 8 steel-melting holes; first cast made in July, 1889. Removed to a new site at Reading, and erecting works to contain 6 double puddling furnaces, 3 trains of rolls, (one 7, one 10, and one 16-inch,) 5 hammers, and 24 four-pot steel-melting holes. Product to be crucible steel, steel forgings, and special steel for tools, cutlery, files, etc.; annual capacity, 7,200 net tons. Brand, "Carpenter's Steel." James K. Wright, President; Robert W. Hawkesworth, Treasurer; J. H. Carpenter, General Manager.

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Company organized in 1864. Four mills: A and B at Catasauqua and C and D at Ferndale; 30 single and 10 double puddling furnaces, 12 reverberatory heating furnaces, one Riley and one Smith gas reheating furnace, 11 trains of rolls, (one 8, two 10, one 15, three 18, and two 21-inch bar, one 22-inch two-high and one 31-inch three-high plate trains,) and one 10-ton hammer; product, high-grade tank, ship, bridge, and boiler plates, merchant bars, bands, shapes, axles, angles, and skelp, iron or steel; annual capacity, 40,000 net tons. Brands of bar iron, "Catasauqua Refined," "Catasauqua Rivet," and "Catasauqua Stay-bolt;" of plates, "Refined," "Shell," "Flange," and "Fire-box." Oliver Williams, President; John Williams, Secretary; Henry Davis, Treasurer. Selling agents: Justice Cox, Jr., & Co., 224 South Fourth st., Philadelphia; E. T. Day, 95 Liberty st., New York; and home office, Catasauqua.

Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. Philadelphia office, 335 Walnut st. Built in 1874-5; 11 double puddling furnaces, 5 heating furnaces, (of which two are Siemens heating furnaces,) one hammer, and 5 trains of rolls, one being a 3-high 60-inch plate train; product, tank, ship, bridge, and boiler plate iron; annual capacity, 12,000 net tons. Open-hearth steel plant added in 1881-2, consisting of two 15-gross-ton Siemens furnaces; annual capacity, 22,500 net tons of ingots, worked into plates. Bessemer steel plant added in 1889, consisting of two 3-gross-ton converters and blooming mill; daily capacity, 300 net tons of ingots, worked into nail slabs, etc. S. A. Crozer, President; S. A. Crozer, Jr., Vice-President and Treasurer; R. Peters, Jr., Secretary; C. B. Houston, General Manager. *See Schuylkill Valley Furnaces.*

- Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Built in 1871; two Robert-Bessemer converters erected in 1889; first blow made in November, 1889; also use special process; product, steel castings. E. P. Dwight, President and Treasurer; A. G. Lorenz, Secretary; J. J. Deemer, Superintendent.
- Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. General office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; rebuilt in 1882-3; 7 double puddling furnaces, 7 heating furnaces, and seven 20-inch trains of rolls; steam and water power; product, sheet, flue, and plate iron of all kinds; corrugated iron a specialty; annual capacity, 7,000 net tons. Brands, "Anchor," "Hope," "Soft Steel," "R. G.," "Blue Annealed," and "Common Red." John Wood, President; George W. Wood, Vice-President and General Manager; Charles M. Wood, Secretary; William M. Wood, Treasurer.
- Crane Iron Company, Catasauqua, Lehigh county. Office, 224 South Fourth st., Philadelphia. One $1\frac{1}{2}$ -ton experimental Robert-Bessemer steel converter, built in 1889. *See Lehigh Valley Furnaces.*
- Douglassville Iron Company Limited, Douglassville, Berks county. Built as a forge in 1878; rolling mill added in 1887; 5 double puddling furnaces, one hammer, and one train of rolls; product, muck bar; annual capacity, 7,400 net tons. D. K. Flannery, President and Manager; John H. Egolf, Treasurer; Dr. F. R. Gerhard, Secretary.
- Easton Sheet Iron Works, Theodore Oliver, Easton, Northampton county. Started February 1, 1872; one double and one single puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and one train of 22-inch rolls; product, bloom and refined sheet iron; annual capacity, 1,000 net tons. Selling agents, Marshall Lefferts & Co., 54 Cliff st., New York.
- Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Built in 1884-5; 20 double puddling furnaces, 2 gas heating furnaces, three 22-inch trains of rolls, and 105 nail machines; product, "Keystone" iron and steel nails; annual capacity, 300,000 kegs. G. B. Lessig, Chairman; W. S. Ellis, Treasurer; J. B. Lessig, Secretary.
- Eureka Cast Steel Company, Lamokin, one mile south of Chester, Delaware county. Post-office address, Chester. Built in 1877; product, steel castings of all kinds; specialty, steel propellers and railroad castings. Amos Gartside, President and Treasurer; H. B. Faunce, Secretary; Wm. B. Reaney, Manager.
- Gibraltar Iron Works, Simon Seyfert, Reading. Built in 1846, and rebuilt in 1883-4; 2 heating furnaces and one 18-inch train of rolls; product, boiler plate and boiler tube and pipe iron; annual capacity, 4,000 net tons. *See Bloomaries.*
- Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown,

Montgomery county. Works in ninth ward. Puddle mill built in 1874; 7 double puddling furnaces and one train of muck rolls; steam and water power. Plate mill No. 1 built in 1875; 3 heating furnaces and one train of rolls 96 inches long; annual capacity, 8,000 net tons. Plate mill No. 2 completed in 1889; one train of rolls; annual capacity, 8,000 net tons. Steel plant built in 1885-6; two 3-gross-ton Clapp-Griffiths converters; one soaking pit; first blow made May 11, 1886; annual capacity, 50,000 net tons. Specialties, "Glasgow" marine steel, "Glasgow" extra locomotive steel, and bridge plates. Comly B. Shoemaker, President and General Manager; Joseph L. Bailey, Treasurer; Richard W. Bailey, Secretary. Selling agents, D. F. Cooney, 88 Washington st., New York; Harrington & Robinson, 10 Oliver st., Boston.

Glen Iron Works, The Allentown Rolling Mills, lessees, Allentown. First put in operation in 1870; 8 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8½ and two 15-inch); product, puddled bar, tops and bottoms, and spike rods; annual capacity, 7,500 net tons. *See Allentown Rolling Mills. See Lehigh Valley Furnaces.*

Hamburg Rolling Mill, W. W. Nevegold, lessee, Berks P. O., Berks county. Works at Hamburg, Berks county. Built in 1865; 7 double puddling furnaces, one cupola furnace, 2 heating furnaces, and 2 trains of rolls (10 and 18-inch); product, bar, band, and hoop iron. Owned by the Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia.

Iowa Barb Wire Company, Allentown, Lehigh county. Built in 1889; 2 gas heating furnaces and 4 trains of rolls, (9, 10, 14, and 16-inch); product, wire rods; annual capacity, 35,000 net tons. Fuel used, anthracite coal and oil gas. Charles Douglass, President; George S. Douglass, Secretary and Treasurer.

Keystone Iron Works Limited, Reading, Berks county. Built in 1857; one double and 5 single puddling furnaces, 2 heating furnaces, and one 18-inch train of rolls; product, boiler plate, skelp, tank, chute, boat, and car iron, and muck bar; annual capacity, 5,000 net tons. Jacob Snell, Chairman; J. H. Craig, Secretary and Treasurer.

Laurel Iron Works, operated by Coatesville Iron Works, W. J. Carmichael, Manager, Coatesville, Chester county. Built in 1825; one annealing furnace, 3 heating furnaces, and 2 trains of rolls; water and steam power; product, flue and tube iron; annual capacity, 6,000 tons.

Little Schuylkill Rolling Mill, Port Clinton, Schuylkill county. Built in 1868; one single and 2 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 10, one 16, and one 18-inch); water and steam power; product, merchant bar, guide iron, tee, channel, and angle iron; annual capacity, 2,500 net tons. Idle. W. L. McDowell, Trustee, 123 North Second st., Philadelphia.

Longmead Iron Works, Jawood Lukens, Conshohocken, Montgomery

county. Built in 1882, and put in operation in November, 1882; 6 double puddling furnaces and one train of 20-inch rolls; product, muck bar; annual capacity, 8,400 net tons.

Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Built in 1810; 3 double puddling furnaces, 5 heating furnaces, 2 trains of rolls, and one hammer; steam and water power; product, all kinds of boiler and ship plates, flue and bridge iron, and homogeneous steel plates; also machine-flanged boiler heads; annual capacity, 11,000 net tons. The puddle mill, operated by steam and water power, occupies the site of the first plate mill built in the United States. The firm is erecting a plate mill with one 3-high train of chilled rolls, 120 in. x 34 in., and hydraulic automatic tables; 4 large heating furnaces, with hydraulic charging and drawing crane; estimated annual capacity, 35,000 net tons of steel plates.

McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. First put in operation in 1857; 2 double and 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (break-down rolls 52 in. x 25 in., and finishing rolls, 81 in. x 25 in.,) and one 3-ton hammer; product, every variety of plate iron; annual capacity, 6,000 net tons. Brand, "McIlvain." *See Bloomaries.*

Norristown Iron Works, James Hooven, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, (one 10 and two 18-inch,) and one hammer; product, skelp iron, part of which is made by the firm into butt-welded pipes and the remainder sold; annual capacity, 5,000 net tons.

Parkesburg Iron Works, Parkesburg Iron Company, Parkesburg, Chester county. First started in April, 1873, enlarged in 1887 and 1889; 6 double puddling furnaces, 6 charcoal finery fires, 6 heating furnaces, one 20-inch train of 3-high muck rolls, two 2-high plate trains, (22 in. x 50 in. and 22 in. x 60 in.,) and 2 hammers; product, boiler tube skelp and boiler iron and steel; annual capacity, 9,000 net tons. Brand, "P. I. Co." Horace A. Beale, President; William H. Gibbons, Vice-President; Amos Michener, Secretary; Samuel R. Parke, Treasurer; A. J. Williams, General Manager.

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Built in 1808; 16 double puddling furnaces and 3 trains of rolls (one 3-high 26-inch and two 3-high 20-inch.) New mill built in 1873; 3 small and 10 large and 3 double Siemens heating furnaces, 24 Siemens and 39 other gas producers, using anthracite coal, and 5 trains of rolls (one 9, one 13, two 20, and one 24-inch.) Steel works built in 1888-9; two 15-ton open-hearth steel furnaces, and blooming mills; first steel made in February, 1889. Product, bars, beams, channels, angles, tees, and miscellaneous structural shapes of iron and steel;

combined annual capacity, 50,000 net tons. David Reeves, President; W. H. Reeves, General Superintendent; George Gerry White, Secretary; James O. Pease, Treasurer. *See Safe Harbor Rolling Mills. See Schuylkill Valley Furnaces.*

Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Telegraph address, Manatawny Station. Glendale mill, built in 1881; 2 heating furnaces and one train of 84 in. x 24 in. rolls; product, iron and steel plates of all kinds; annual capacity, 4,500 net tons. Brands, "Pine" iron and "Pine" steel, for the most severe requirements. (Pine mill, built in 1845, and run by water-power, has been abandoned.)

Plymouth Rolling Mill, Conshohocken, Montgomery county. Built in 1881-2; 8 double puddling furnaces, 6 heating furnaces, 4 trains of rolls, and 12 nail machines; product, muck bar, plate and sheet iron, plate and sheet steel, and nails; annual capacity, 10,500 net tons of muck bar, 9,500 tons of finished iron, and 20,000 kegs of nails. Idle since failure of Plymouth Rolling Mill Company in April, 1889. Owned by Isaac Fegeley, of Pottstown, and Walter Wood, of Phila.

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, plate iron (comprising boiler, tank, pipe, and flue iron) and muck bar; annual capacity, 9,000 net tons of muck bar and 11,000 tons of plate iron. Specialties, pipe and flue iron. George H. Potts, Chairman; H. C. Hitner, Secretary and Treasurer.

Pottstown Iron Company, Pottstown, Montgomery county. Built in 1863 and enlarged in 1867; 31 double puddling furnaces, 8 Siemens heating furnaces, 6 forge fires, 95 nail machines, one hammer, and 7 trains of rolls (18-inch muck, 21-inch muck, 23-inch muck, 23-inch nail plate, 24-inch universal, 25-inch plate, and 31-inch plate); product, charcoal blooms, muck bar, nails, and boiler, ship, bridge, and tank plate iron; annual capacity, 35,000 net tons of muck bar, 2,500 tons of blooms, 35,000 tons of plate iron, and 425,000 kegs of nails. Steel works built in 1885-6, with three 10-gross-ton Bessemer converters and a 36-inch blooming mill; first blow made July 1, 1886; one 12-ton Siemens open-hearth furnace, built in 1885-6; product, used in making nail plate and other plate and merchant steel. William H. Morris, President; Andrew Wheeler, Vice-President; Joseph K. Wheeler, Secretary; William M. Gordon, Treasurer. *See Schuylkill Valley Furnaces.*

Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville. Old mill built to make rails in 1852, rebuilt and improved since, and altered to make shapes in 1877; 10 double puddling furnaces, 12 heating furnaces, one hammer, and 4 trains of rolls (one 12, two 19, and one 23-inch); product, iron and steel beams, channels, angles, tees,

bars, and shafting; total annual capacity, 30,000 net tons. Brand, "Pottsville." Steel department contains two 3-ton Clapp-Griffiths converters; first blow made February 2, 1886; product, billets, blooms, and ingots for own use and for sale; annual capacity, 30,000 net tons. Blooming mill built in 1887, containing 32-inch rolls, for blooming Clapp-Griffiths ingots. William Atkins, President and Treasurer; John M. Callen, Secretary. Selling agents, J. F. Bailey, 257 South Fourth st., Philadelphia; William H. Wallace & Co., 131 Washington st., New York. *See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh & Son, Reading. Bolt and nut works organized in 1865; rolling mill department organized in 1871; and the whole enlarged in 1872, 1881, and 1886; 3 heating furnaces and 3 trains of rolls (one 9, one 10, and one 12-inch); oil used for fuel in forging department; product, refined merchant bar and bolt iron; also, more especially, bolts, nuts, washers, rivets, screw drivers, etc.; annual capacity, 10,000 net tons.

Reading Iron Company, Reading, Berks county. Branch office, 417 Walnut st., Philadelphia. Rolling mill built in 1836; 10 single and 2 double puddling furnaces, 3 heating furnaces, one scrap furnace, and 3 trains of rolls; product, grooved skelp iron; annual capacity, 10,000 net tons. Plate mill built in 1863; 9 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, sheared skelp and boiler plate iron; annual capacity, 12,000 net tons. Have also three tube works for the production of wrought iron pipe, boiler tubes, oil well casing, etc.; annual capacity, 50,000 net tons. Also foundry and machine shop, for the production of all classes of rolling mill and blast furnace machinery, large castings, cotton compressors, and all other general machinery. Also a steam forge for the production of all classes of marine, engine, and general forgings. George F. Baer, President; F. C. Smink, Treasurer and General Manager. *See Schuylkill Valley Furnaces.*

Reading (The) Rolling Mill Company, lessee, Reading, Berks county. Philadelphia office, 257 South Fourth st. Built in 1868; 12 single puddling furnaces, 10 heating furnaces, 2 forge fires, and 4 trains of rolls (one 13 and three 23-inch.) Formerly called Philadelphia and Reading Rolling Mill. Enlarging the works for the purpose of rolling beams, channels, tees, angles, bars, and other forms of structural iron and steel.

Schuylkill Haven Rolling Mill, Schuylkill Haven Iron Company, Pottsville. Mill at Schuylkill Haven, Schuylkill county. Put in operation October 1, 1873; 2 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one railroad spike, bolt, and rivet machine; product, merchant bar iron, small T rails for mining purposes, railroad spikes, bolts, and rivets; specialty, refined bar iron; annual capacity, 6,000 net tons. L. W. Weissinger, President; C. F. Rahn, Treasurer.

Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county. Built in 1858; 15 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, and one hammer; product, sheet and plate iron and steel; annual capacity, 15,000 net tons. Howard Wood, President; Jona R. Jones, Secretary and Treasurer. *See Rolling Mills in Delaware.*

Seyfert Rolling Mills, Samuel R. Seyfert, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Built in 1880-1, and started in March, 1881; 8 double puddling furnaces, 4 heating furnaces, one 4-ton hammer, one rotary squeezer, and 2 trains of rolls (22 and 25-inch); product, boiler plate, boiler-tube skelp, pipe skelp, and puddled bars; annual capacity, 12,000 net tons of plate iron and 10,000 net tons of puddled bars.

Standard Iron Company Limited, Norristown, Montgomery county. Built in 1857; 11 double puddling furnaces and 2 trains of 18-inch puddle rolls; product, puddled bars; annual capacity, 14,000 net tons. Walter H. Cooke, Chairman; John Slingluff, Secretary and Treasurer. Idle and for sale. Occupied in 1889 by the Continental Steel Car Wheel Company for experiments in rolling car wheels.

Standard Steel Casting Company, Thurlow, Delaware county. Telegraph address, Chester. Built in 1883-4, and first put in operation in March, 1884; one 15-ton Siemens-Martin and one 20-ton Lash open-hearth steel furnace; product, open-hearth steel castings. Robert Wetherill, President; Richard Wetherill, Secretary and Treasurer; Frederick Baldt, Superintendent.

Stony Creek Rolling Mill, Stony Creek Iron Company Limited, Norristown, Montgomery county. Built in 1849, and rebuilt in 1879 and 1887; 5 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, grooved and sheared skelp, merchant bars, ovals, half ovals, rounds, and horse-shoe iron; annual capacity, 7,500 net tons. Chester Bertolette, President; Jas. S. Swartz, Treasurer, 234 South Fourth st., Philadelphia.

Thorndale Iron Works, Thorndale Iron Works Company, William L. Bailey, Treasurer and Manager, Thorndale P. O., Chester county. Telegraph address, Downingtown. Built in 1847; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (plate train 73 inches long); product, boiler and tank iron and ship plates; annual capacity, 4,000 net tons of plates and 5,000 net tons of puddled bars. Brand, "Thorndale." Charles L. Bailey, President, Harrisburg; Abraham S. Patterson, Vice-President, Philadelphia. Selling agents, Morris, Wheeler & Co., 400 Chestnut st., and Esherick, Cotton & Co., 263 South Fourth st., Philadelphia; W. H. Wallace & Co., New York; George B. Topliff, Boston.

Tidewater Steel Works (Combination Steel and Iron Company, proprietors,) Chester, Delaware county. Built in 1881; 10 heating furnaces,

3 trains of rolls, (12, 20, and 22-inch,) and 3 rivet machines; product, steel rails, steel and iron fish-plates, track bolts and spikes, angles, and bars; annual capacity, 45,000 net tons. C. A. Weed, President and General Manager, Chester; Stephen E. Haas, Secretary and Treasurer, 35 South Third st., Philadelphia.

Valley Iron Works, W. W. Kurtz & Sons, Coatesville, Chester county. Philadelphia office, Bullitt Building. Built in 1837, and rebuilt in 1888; 5 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 18 in. x 72 in. muck, and one 24 in. x 72 in., one 30 in. x 96 in., and one 30 in. x 110 in. plate); product, boiler, bridge, ship, and tank plate; annual capacity, 7,000 net tons.

Viaduct Iron Works, Coatesville Rolling Mill Company, Coatesville, Chester county. Built in 1838; 3 double puddling furnaces, 8 heating furnaces, 4 trains of rolls, and one hammer; product, boiler tube, skelp and steel and iron sheets; annual capacity, 15,000 net tons. *See Brandywine Rolling Mills.*

Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 50 completed, and 2 building. Of these 4 make Bessemer steel, 2 make Clapp-Griffiths steel, 2 make Robert-Bessemer steel, 5 make open-hearth steel, 2 make special steel, and one crucible steel plant is being built.

PROJECTED.

Pennsylvania Rolled Steel Car Wheel Company, Norristown, Montgomery county. Preparing to erect a mill for rolling steel car wheels.

CENTRAL PENNSYLVANIA.

Altoona Iron Company, Altoona, Blair county. First put in operation in April, 1873; 11 double and 6 single puddling furnaces, 4 heating furnaces, 4 trains of rolls, (two 8, one 16, and one 18-inch,) and one 3-ton hammer; product, bar, band, hoop, oval, half oval, half round, and scroll iron; annual capacity, 15,000 net tons. Light irons a specialty. Brand, "Altoona." James Gardner, President; H. K. McCauley, Secretary; T. S. Gardner, Treasurer; Robert Smiley, Manager of mill.

Bellefonte Iron and Nail Company, Bellefonte, Centre county. Built in 1881-2; put in operation March 1, 1882; 10 single and 2 double puddling furnaces, 3 heating furnaces, 4 trains of rolls, (one 9 and one 15-inch bar train, one 16-inch nail-plate train, and one 17-inch muck train,) and 53 nail machines; product, muck bar, bar iron, nails, and spikes; annual capacity, 5,000 net tons of bar iron and 125,000 kegs of cut nails. Brand, "Bellefonte." James A. Beaver, President; L. T. Munson, Secretary, Treasurer, and General Superintendent.

Bradford County Nail Works, R. A. Bostley & Godcharles, Towanda, Bradford county. First started in November, 1872; one single and 3

double puddling furnaces, 2 heating furnaces, 31 nail machines, and two 19-inch trains of rolls; product, iron and steel nails; annual capacity, 70,000 kegs. Brand, "Bradford County Nail Works."

Central Iron Works, Harrisburg, Dauphin county. First mill built in 1853; new mill built in 1878; puddle mill contains one single and 7 double puddling furnaces; boiler plate mill contains one gas and 5 coal heating furnaces, 5 trains of rolls, (one muck, one 25-inch and one 31-inch roughing, one Lauth 3-high 25-inch and one Lauth 3-high 31-inch chilled finishing,) with large Morgan guillotine shears, (knives 100 inches long,) and other shears, cranes, etc.; product, boiler plate and tank iron and boiler plate steel; annual capacity, 18,000 net tons of plates. Charles L. Bailey, President; Edward Bailey, Vice-President; William E. Bailey, Secretary; G. M. McCauley, Treasurer; John N. Binnix, Superintendent.

Centre Iron Company, Bellefonte, Centre county. Main office, Bullitt Building, Philadelphia. Built in 1798; one heating furnace, 3 double puddling furnaces, and one train of rolls; water-power; product, muck bar; annual capacity, 3,600 net tons. James B. Coryell, President; B. K. Jamison, Vice-President; Charles A. Harte, Secretary and Manager; F. B. Owen, Treasurer. *See Juniata Valley Furnaces.*

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) Harrisburg, Dauphin county. Built in 1867; 18 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (one 20-inch puddle and one 16-inch plate,) and 103 nail machines; product, iron and steel nails and muck bar; annual capacity, 250,000 kegs of nails and 6,000 net tons of muck bar. Brand, "Chesapeake." Charles L. Bailey, President; Edward Bailey, Vice-President; John C. Harvey, Secretary and Treasurer.

Chickies Rolling Mill, Chickies Rolling Mill Company, Chickies, Lancaster county. Built in 1865; 4 double puddling furnaces and 2 trains of rolls (9 and 16-inch); product, muck bar; annual capacity, 4,000 net tons. Idle.

Columbia Iron Company, Columbia, Lancaster county. 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; annual capacity, 12,000 net tons. Andrew J. Kauffman, President; J. W. Yocum, Secretary and Treasurer; C. S. Kauffman, General Manager.

Columbia Rolling Mill Company, Columbia, Lancaster county. Built in 1854, and remodeled and enlarged in 1885; 11 double puddling and 4 heating furnaces and 4 trains of rolls; product, skelp and tube iron; annual capacity, 15,000 net tons. Built to roll rails. John Q. Denney, President and General Manager; J. W. Steacy, Treasurer; John J. Cochran, Secretary. *See Lower Susquehanna Furnaces.*

Dalmatia Nail and Iron Company, Dalmatia, Northumberland county.

Telegraph address, Georgetown. First put in operation in March, 1887; 20 nail machines; product, cut nails and spikes. Buildings erected for a rolling mill department. W. H. Moyer, President; John Bingeman, Vice-President; W. O. Bingeman, Secretary; E. D. Messner, Treasurer.

Danville Nail Works, Danville Nail and Manufacturing Company, Danville, Montour county. Built in 1883, and first nails made August 31, 1883; 3 double puddling furnaces, two large heating furnaces, 2 trains of rolls, (18-inch puddle and 3-high 20-inch plate,) and 92 nail machines; product, iron and steel nails; annual capacity, 250,000 kegs. William C. Frick, President; John E. Hill, Secretary; R. M. Grove, Treasurer.

Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; 16 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (8, 16, 18, and 20-inch,) and 64 nail machines; product, bar iron and iron and steel nails; annual capacity, 5,000 net tons of bar iron and 135,000 kegs of nails. John Wister, President and Treasurer; William E. S. Baker, Secretary and Assistant Treasurer. *See Upper Susquehanna Furnaces.*

Eagle Iron Works, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1825; one single puddling furnace, one heating furnace, and two 15-inch trains of rolls; water-power; product, wire billets, boiler-plate pile covers, and assorted bar iron from half-inch round and square to 4-inch tire; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

Franklin Iron Works, Rohrerstown, Lancaster county. Enlarged in June, 1872; one double and 5 single puddling furnaces, one heating furnace, and 2 trains of rolls; product, merchant bar iron and muck bar; annual capacity, 4,000 net tons. Idle and for sale.

Green Ridge Iron Works, A. L. Spencer, Scranton, Lackawanna county. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; enlarged in 1887; two heating furnaces and 2 trains of rolls (10 and 12-inch); product, bar, angle, and channel iron, car axles, 25-lb. mine rails, strap rails, toe-calk steel, and bar steel; annual capacity, 2,000 net tons of bar and shaped iron and 6,000 tons of mine and strap rails. Fuel used, anthracite culm. W. B. Borst, Superintendent; D. B. Atherton, Secretary and sales agent.

Harrisburg Nail Works, Harrisburg, Dauphin county. Works at Fairview, Cumberland county, on the Northern Central Railway. Built in 1810; 9 double puddling furnaces, 4 heating furnaces, two 19-inch trains of rolls, and 83 nail machines; steam and water power; product, iron and steel nails and muck bar; annual capacity, 10,000 net tons (200,000 kegs) of nails and 2,000 tons of muck bar. Brand, "Harrisburg." Henry McCormick, Treasurer. Owned by the McCormick Estate.

Harrisburg Rolling Mill Company, Trust Building, Harrisburg, Dauphin county. Original works built in 1865 to roll rails; 12 double and 2 single puddling furnaces, 10 heating furnaces, and 3 trains of rolls (9, 16, and 19-inch); product, skelp iron; annual capacity, 45,000 net tons. Formerly called Lochiel Iron and Steel Works. R. C. Neal, President and Treasurer; John Y. Boyd, Vice-President; J. W. Covert, Secretary.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Built in 1860; one double and 7 single puddling furnaces, 2 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 18-inch,) and 23 nail machines; product, merchant bar angle, channel, skelp, and hoop iron, flat and small tee rails, and cut nails and spikes; annual capacity, 60,000 kegs of cut nails and 3,000 net tons of other products. Brand, "IXL." J. D. Hemphill, President; J. W. Bracken, Treasurer and General Manager; Thomas F. Johnston, Secretary.

Howard Rolling Mills, Jenkins Brothers & Lingle, Bellefonte. Works at Howard, Centre county. Built in 1840; 8 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 12-inch, one 16-inch, and one rod mill); water-power; product, bar iron; annual capacity, 6,000 net tons. *See Bloomaries.*

Jackson (The) and Woodin Manufacturing Company, Berwick, Columbia county. Built in 1872; 11 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls (one 9, one 16, and one 3-high 18-inch); product, merchant bar iron and forgings; annual capacity, 16,000 net tons. Brand, "Berwick." Also manufacture cars and car-wheels and cast-iron gas and water pipe. C. R. Woodin, President; C. H. Zehnder, Vice-President and General Manager; Wm. F. Lowry, Treasurer; Frederick H. Eaton, Secretary; H. F. Glenn, General Superintendent.

Juniata Rolling Mill, McLanahan, Smith & Co. Limited, lessees, Hollidaysburg. Built in 1866; 14 single puddling furnaces, 3 heating furnaces, one muck and nail-plate train of rolls combined, one 10-inch train of finishing rolls, and 30 nail machines; product, bar and pipe iron and cut nails and spikes; annual capacity, 8,000 net tons. Brand, "J. B." The members of the company are James Denniston, J. King McLanahan, A. S. Landis, C. H. Porter, and C. H. Smith.

Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Commenced in 1840; 42 single puddling furnaces, 33 heating furnaces, and 10 trains of rolls, (one 12, two 18, two 20, three 23½, one 31, and one 36-inch,) and 2 hammers; product, light and heavy railroad rails, merchant bars, and car axles; annual capacity, 220,000 net tons of steel and iron rails and 15,000 tons of iron and steel merchant bars and car axles. Bessemer steel works added in 1875; two 7-gross-ton converters, 6 cupolas, and 3 spiegel cupolas; annual capacity, 200,000 net tons of ingots; first blow made

October 23, 1875; first steel rail rolled December 29, 1875. Brand, "Lackawanna." Preparing to erect an additional 7-gross-ton converter and a train of rolls adapted for rolling either rail blooms or billets for rods. Use anthracite culm for fuel under boilers. E. F. Hatfield, President, 52 Wall st., New York; H. V. Vultee, Secretary, New York; Edward C. Lynde, Assistant Secretary, Scranton, Pa.; Theodore Sturges, Treasurer, New York; E. S. Moffat, General Manager, Scranton, Pa. *See Upper Susquehanna Furnaces.*

Lebanon Iron Company, Lebanon. Built in 1882-3; 7 double puddling furnaces and two 20-inch trains of rolls; product, muck bar; annual capacity, 12,000 net tons. Adding 3 heating furnaces and one 12-inch and one 20-inch train of rolls. Robert H. Coleman, President; A. Hess, Secretary and Treasurer; Thomas Evans, Superintendent.

Lebanon Rolling Mills, Lebanon, Lebanon county. Built in 1867; 10 double puddling furnaces, 6 heating furnaces, 6 forge fires, 7 trains of rolls, and 2 hammers; product, boiler plates, skelp, muck bar, and charcoal blooms; annual capacity, plates and skelp iron, 12,000 net tons. Samuel E. Light, President; Richard Meily, Treasurer; J. H. Roberts, Secretary. *See Bloomaries.*

Lewisburg Rolling Mill, Wm. C. Frick, lessee, Danville. Works at Lewisburg, Union county. Built in 1884; 5 double puddling furnaces, one heating furnace, one 18-inch train of rolls, and 41 nail machines; only operating puddling department; annual capacity, 6,000 net tons of muck bar.

Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. Built in 1886-7, and put in operation September 5, 1887; two 3-gross-ton Clapp-Griffiths steel converters and one 24-inch blooming mill. Robert-Bessemer plant added in 1889; one 1½ and one 5-gross ton converter. Product, billets for nails; annual capacity, 22,000 net tons. John H. Lick, President; C. Penrose Sherk, Managing Director; J. L. Rutter, Secretary and Treasurer; Samuel Groh, Superintendent.

Lock Haven Nail Company, Lock Haven, Clinton county. Built in 1886-7; first put in operation May 20, 1887; 4 double puddling furnaces, one heating furnace, 2 trains of rolls, (one 20-inch muck and one 22-inch plate,) and 20 nail machines; product, cut nails; annual capacity, 50,000 kegs. Brand, "Lock Haven Nail Co." S. A. Rumbaugh, President; W. J. S. Sheibley, Secretary; John A. Wilkinson, Treasurer; John Winter, Sr., Superintendent of rolling mill; George B. Rumbaugh, Manager of nail factory.

Logan Iron and Steel Works, Logan Iron and Steel Company, Lewistown, Mifflin county. Office, 218 South Fourth st., Philadelphia. Started in 1869; one single and 10 double puddling furnaces, 5 heating furnaces, 3 hammers, and 5 trains of rolls (one 8, one 12, one 16, and two 18-inch); steam and water power; product, charcoal and

refined bar iron, bent truck sides, and coupling links and pins. H. T. Townsend, President; S. H. Pitcher, Secretary; R. F. Kennedy, Treasurer; R. H. Lee, Superintendent. *See Charcoal Furnaces. See Juniata Valley Furnaces.*

Mahoning Rolling Mill, Mahoning Rolling Mill Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Built in 1847, and rebuilt since; 10 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 13½-inch skelp, one 16½-inch skelp, and one 19-inch puddle and breaking down train); product, skelp iron; annual capacity, 30,000 net tons. Also own a large machine shop and foundry with a capacity of 100 tons per week. Abraham S. Patterson, President; William C. Frick, Treasurer and General Manager.

McCormick & Co., Harrisburg, Dauphin county. Built in 1886; one 3-ton Clapp-Griffiths steel converter; experimental blow made April 27, 1886. Idle. *See Lower Susquehanna Furnaces.*

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 3 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 2 hammers; steam and water power; product, all sizes of bar iron, also soft wire rods for wire, flat and round head screws, and best grade of carriage bolts; annual capacity of bar mill, 1,800 net tons; rod mill, 1,500 net tons. *See Charcoal Furnaces. See Bloomaries.*

Milton Manufacturing Company, Milton, Northumberland county. Built in 1886-7, and first put in operation in February, 1887; remodeled in 1889, and fitted up with machinery for making wrought iron washers; 4 puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one muck and one 6 and one 10-inch bar); product, cold punched washers, muck bar, and bar iron. S. J. Shimer, President; E. S. Shimer, Secretary and Treasurer; G. S. Shimer, Superintendent.

Milton Nail Works, The C. A. Godcharles Company, Milton, Northumberland county. Built in 1875, and enlarged in 1889; 4 single and 9 double puddling furnaces, 3 heating furnaces, rotary squeezer, one 3-high puddle and one 20-inch finishing train of rolls, and 100 nail machines; product, iron and steel nails; annual capacity, 200,000 kegs. Selling agents, Fuller Brothers & Co., New York.

Milton Rolling Mill and Steam Forge, Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 6 single and 3 double puddling furnaces, 2 Smith gas heating furnaces, rotary squeezer, and 3 trains of rolls (one 8, one 15, and one 18-inch); product, round, square, and flat bar iron; annual capacity, 4,000 net tons. Forge contains 3 heating furnaces, 2 hammers, and other machinery for the production of car axles and iron and steel forgings. Brand, "Milton." W. A. Schreyer, President; Fred. M. Kelly, Secretary; John M. Young, Treasurer; John Jenkins, Superintendent. *See Williamsport Iron and Nail Works.*

Montour Iron and Steel Works, Montour Iron and Steel Company,

Danville. Built in 1845; 27 single and 7 double puddling furnaces, 14 heating furnaces, 5 trains of rolls, (one 12, one 16, and three 20-inch,) and one 5-ton hammer; product, iron and steel rails, bar iron, spikes, splice bars, and structural shapes; annual capacity, 50,000 net tons. Austin Corbin, President, Philadelphia; W. E. C. Coxe, Vice-President, and T. F. McGinnes, General Superintendent, Danville; F. P. Kaercher, Secretary, and W. A. Church, Treasurer, 227 South Fourth st., Philadelphia. *See Upper Susquehanna Furnaces.*

North Branch Steel Works, North Branch Steel Company, Danville, Montour county. Office, 330 Walnut st., Philadelphia. Mill formerly known as the Co-operative Iron and Steel Works; established in 1871, and operated for years as a rail mill; changed to a steel works in 1882-3, and open-hearth steel plant added; first steel made February 15, 1883; one 15-gross-ton Siemens open-hearth steel furnace; annual capacity, 12,000 net tons. Bessemer steel works built in 1887-8; two 4-gross-ton converters, two Hainsworth soaking pits, and one 32-inch reversing blooming train; annual capacity, 120,000 net tons of ingots. Rolling mill contains 5 coal and 2 gas heating furnaces and 2 trains of rolls (22-inch shape and rail and 28 x 84-inch plate). Product, steel boiler, ship, and tank plates, shovel plates, rails, blooms, slabs, shapes, machinery and agricultural steel, and sheared skelp iron; annual capacity, 60,000 net tons of rails and shapes and 12,000 net tons of plates and skelp iron. Edward Samuel, President; Walter S. Massey, Treasurer; Charles M. Griffith, Secretary; F. P. Howe, General Manager. *See Upper Susquehanna Furnaces.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 8 single puddling furnaces, one large regenerative gas heating furnace, one 16-inch train of muck and plate rolls, and 53 nail machines, having Coyne's patent automatic nail assorters and Morrison's spike rejecter attached; product, iron and steel nails, axe bar, nail plate, and muck and scrap bar; annual capacity, 5,400 net tons of muck bar, 9,500 tons of nail plate, and 150,000 kegs of nails. Also have a foundry and machine shop.

Paxton Rolling Mills, Harrisburg, Dauphin county. Built in 1869; 7 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, and one 3-ton hammer; product, boiler plate, tank, and skelp iron; annual capacity, 10,000 net tons. Brand, "Paxton." John Q. Denney, Superintendent. Owned by the McCormick Estate.

Penn Iron Works, Penn Iron Company Limited, Lancaster, Lancaster county. First put in operation in April, 1873; 7 double puddling furnaces, 5 heating furnaces, 4 trains of rolls, (one 8-inch guide, one 10-inch guide, one 16-inch bar, and one 18-inch puddle,) and 2 hammers; product, merchant bar iron, hammered and rolled axles, car forgings,

bridge work, fish joints, bolts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 15,000 net tons. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Secretary and Treasurer; W. B. Middleton, Superintendent.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; burned and rebuilt in 1886; one coal and one Smith gas heating furnace and one 10-inch train of rolls; product, bar iron, bolts, nuts, washers, etc.; annual capacity, 9,000 net tons. Arthur Brock, President; James Lord, Secretary and Treasurer.

Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel works built in 1865-7; two 7-gross-ton and three 8-gross-ton converters; first blow made in June, 1867; annual capacity, 350,000 net tons ingots, worked into blooms and slabs for structural purposes, plates, nail slabs, rails of all sections, street rails, railroad axles, crossings, frogs, switches, and merchant steels generally. Rolling mill built in 1867-8; blooming mill added to the rolling mill in 1875-6, and put in operation in December, 1876; annual capacity, 200,000 net tons rails. No. 2 blooming mill, reversing, built in 1885-6, and put in operation in 1886. Hammer mill contains 4, 6, and 12-ton hammers. Open-hearth steel plant, containing two 15-gross-ton furnaces, erected in 1875; furnaces removed in 1883, and two 30-ton furnaces erected; annual capacity, 27,000 net tons ingots, worked into boiler and structural steel and special steels. Merchant mill, erected in 1883, contains one 13 and one 20-inch train. Billet mill, erected in 1887, contains one 20-inch train of rolls. There are also machine shops and the necessary repair shops connected with the works. Luther S. Bent, President; E. F. Barker, Vice-President and Treasurer; E. N. Smith, Secretary; F. W. Wood, General Manager; E. C. Felton, Superintendent; H. H. Campbell, Assistant Superintendent. S. W. Baldwin, Sales Agent, New York. *See Lower Susquehanna Furnaces. See Furnaces in Maryland.*

Portage Iron Company Limited, Duncansville, Blair county. Built in 1839, rebuilt in 1882-3; 20 single puddling and 6 heating furnaces, 5 trains of rolls, (one 18-inch muck, one 15-inch bar, one 10-inch hoop, one 8-inch guide, and one 20-inch nail plate,) and 37 nail machines; product, bar, band, hoop, scroll, and angle iron, and iron and steel nails; annual capacity, 8,000 net tons of finished iron and 72,000 kegs of nails. Brand, "Portage." William M. Wheatley, President, Duncansville, Pa.; A. R. Whitney, Vice-President, J. P. Meday, Secretary, and D. A. Nesbitt, Treasurer, all at 17 Broadway, New York.

Safe Harbor Rolling Mill, Phoenix Iron Company, Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. Built in 1848; one single and 18 double puddling furnaces, 8 heating furnaces, and 2 trains of rolls; built to make rails, but has made no rails since 1861,

and was entirely idle from 1865 to February, 1880; product, muck bar. T. F. Patterson, General Manager. *See Phoenix Iron Works. See Schuylkill Valley Furnaces.*

Scranton (The) Steel Company, Scranton, Lackawanna county. Built in 1881-3; two 6-gross-ton Bessemer steel converters, 9 pig-melting cupolas, and 3 spiegel cupolas; first blow made March 29, 1883, and first steel rail rolled May 4, 1883; 6 heating furnaces and 3 trains of 32-inch rolls; product, steel rails and billets; annual capacity, 250,000 net tons of ingots and 220,000 net tons of rails. Brand, "Scranton Steel Co." W. W. Scranton, President and Manager, and E. P. Kingsbury, Secretary and Treasurer, both at Scranton; Walter Scranton, Vice-President, 47 Broadway, New York.

Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 10 heating furnaces, 4 hammers, (one 10-ton and one 15-ton Tannet & Walker, one 7-ton Sellers, and one 30-cwt. Morris,) and 2 tire mills; product, steel locomotive and car tires and forgings. Specialty, locomotive and car-wheel tires. Ingots are obtained from the Otis Steel Company Limited and are worked here. Brand, the word "Standard" between two anchors. George Burnham, President; William Burnham, Secretary and Treasurer; William G. Neilson, Manager; J. P. Stevenson, Superintendent.

Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury, Northumberland county. Built in 1883; first put in operation in August, 1883; 2 single and 3 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 41 nail machines; product, nails; annual capacity, 120,000 kegs. Brand, "Sunbury." John Haas, President; D. Heim, Vice-President; L. T. Rohrbach, Secretary and Treasurer; L. Busler, Superintendent of mill.

Susquehanna Iron Works, Susquehanna Iron Company, Columbia, Lancaster county. Built in 1860; 12 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 11,000 net tons. M. Schall, President; William Patton, General Manager; J. E. Schall, Secretary and Treasurer.

Taggart & Howell, Northumberland, Northumberland county. Built in 1883, and first put in operation in January, 1884; 10 double puddling furnaces, 2 heating furnaces, two 20-inch trains of rolls, and 95 nail machines; product, iron and steel nails and muck bar; annual capacity, 200,000 kegs of nails. Brand, "Taggart & Howell's Mills."

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Office, Trust Building, Harrisburg. Forges established in 1809; rolling mill plant added in 1883; two regenerative gas heating furnaces and one 16-inch train of rolls; product, charcoal boiler-tube skelp; daily capacity of mill, 30 net tons. Use producer gas. John Y. Boyd, President; R. C. Neal, Secretary and Treasurer. *See Bloomaries.*

Watson town Nail Works, Watson town, Northumberland county. Built in 1886-7, and first put in operation in May, 1887; 3 double puddling furnaces, one heating furnace, one forge fire, one 2-high 18-inch train of rolls, and 25 nail machines; product, muck bar and iron and steel nails; annual capacity, 65,000 kegs. Brand, "Watson town Nail Works." J. H. Wagner, President; D. C. Hogue, Secretary and Treasurer; Jesse James, Manager.

West End Rolling Mill Company Limited, Lebanon, Lebanon county. Built in 1872-4; 2 single and 2 double puddling furnaces, 2 heating furnaces, 3 trains of rolls, and one hammer; product, bar and horse-shoe iron, skelp, chains, and car links and pins; annual capacity, 5,000 net tons. Chain works erected in 1884. T. T. Worth, Chairman; H. M. Capp, Secretary and Treasurer; John R. Evans, Superintendent of rolling mill; Jacob Capp, Superintendent of chain works.

Williamsport Iron and Nail Works, Milton Iron Company, Williamsport, Lycoming county. Built in 1873-4; one single and 5 double puddling furnaces, one 6-tuyere run-out fire, 8 forge fires, 2 Smith gas heating furnaces, one hammer, 3 trains of rolls, (one 8, one 17, and one 18-inch,) and 61 nail machines; product, iron and steel nails and charcoal blooms, bars, and wire rods; annual capacity, 140,000 kegs of nails and 5,000 net tons of other manufactured products. *See Milton Rolling Mill and Steam Forge.*

York Rolling Mill, Schall, Steacy, and Denney Company, (incorporated,) York, York county. Built in 1869; 8 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (one 18 and two 22-inch,) and 2 hammers; product, plate and skelp iron; annual capacity, 9,000 net tons. John Q. Denney, President; J. W. Steacy, Treasurer and General Manager; Frank H. Steacy, Secretary. *See Furnaces.*

Number of rolling mills and steel works in Central Pennsylvania: 52. Of these 4 make Bessemer steel, 2 make Clapp-Griffiths steel, one makes Robert-Bessemer steel, and 2 make open-hearth steel.

PITTSBURGH AND ALLEGHENY COUNTY.

Allegheny Bessemer Steel Company, Duquesne, Allegheny county. Built in 1886-8, and first put in operation in 1889; two 6-gross ton Bessemer converters; first blow made in February, 1889, and first rail rolled in March, 1889; 3 soaking pits and 4 trains of rolls (two 21-inch continuous and reversing, one 26-inch, and one 30-inch); rails rolled from ingot at initial heat; annual capacity, 220,000 net tons of rails. Fuel used, natural gas exclusively. Edward L. Clark, President; H. P. Smith, Secretary; F. H. Treat, Manager. Selling Agent, F. G. Gorham, Mills Building, New York.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Iron and Steel Company, Pittsburgh, Allegheny county. Lower mills situated

at Wood's Run Station, Allegheny City; upper mills situated on Tenth and Fifteenth sts., South Side, Pittsburgh. Operations first begun in 1863; 102 single puddling furnaces, 30 heating furnaces, 14 hammers, and 19 trains of rolls (five 8, three 10, four 16, four 20, one 25, one 32, and one 30-inch universal); product, plate, angle, and structural iron and steel, skelp iron, light T rails, bar iron, etc.; part of the iron is used in the production of wrought-iron hardware, consisting of bolts, nuts, washers, hinges, etc.; annual capacity, 120,000 net tons. Steel works, containing two 2-ton Clapp-Griffiths stationary converters, for the production of Bessemer steel for miscellaneous uses, built in 1884; first blow made March 25, 1884; annual capacity in ingots, 48,000 net tons. Fuel used, natural gas exclusively. Henry W. Oliver, President; James Smith, Secretary; James B. Oliver, Treasurer; David B. Oliver, General Manager. *See Shenango Valley Furnaces.*

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Built in 1852; 92 single puddling furnaces, 37 heating furnaces, 17 trains of rolls, 2 hammers, and 63 nail machines. Bessemer steel works built in 1886; two 7-gross-ton converters; first blow made August 19, 1886; product, iron and steel bars, nails, rails, plates, sheets, cold-rolled shafting, and structural shapes; annual capacity, 175,000 kegs of cut nails and 200,000 net tons of other iron and steel products. Brand, "American." Fuel used, natural gas exclusively. B. F. Jones, Chairman; G. M. Laughlin, Secretary and Treasurer.

Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. Two mills. Works at Pittsburgh built in 1842; 24 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (one 12, one 16, and two 18-inch,) 96 nail machines, 75 tack machines, and 2 hammers; product, spikes, nails, tacks, and American and Swedish plates from 4 to 16 inches wide; annual capacity, 200,000 kegs of nails and 5,000 net tons of plates. Works at Rankin Station built in 1886 and enlarged in 1888; gas heating furnaces and 3-high 24-inch plate train; product, steel plates for straps, nails, tacks, stamping, and die work, and also used in the manufacture of "Expanded Metal," a substitute for wire work in fencing, lathing, screens, etc. Fuel used, natural gas exclusively.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. This firm prefers not to give a description of its works for publication.

Braddock Wire Company, Pittsburgh. Works at Rankin Station. Built in 1885-6; 2 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); 4-inch billets rolled directly to No. 5 rods in 18 passes through 4 trains of rolls; product, iron and steel wire rods and plain and barb wire; annual capacity, 40,000 net tons. Fuel used, natural gas exclusively. William Edenborn, President; J. W. Gates, Vice-President; Wallace H. Rowe, Secretary; Charles H. Rowe, Treasurer.

Byers (A. M.) & Co., Pittsburgh. Built in 1862-3; 26 single puddling furnaces, 6 heating furnaces, one scrap furnace, and 3 trains of rolls (one 16, one 18, and one 20-inch); product, bars, plates, sheets, shafting, and skelp iron; annual capacity, 15,000 net tons. Also a galvanizing department, and 2 pipe mills to make lap and butt-welded wrought-iron gas, steam and water pipe, oil-well tubing, casing, boiler flues, etc. Fuel used, natural gas.

Carbon Iron Company, Thirty-second and Smallman sts., Pittsburgh. New York office, Mills Building. Built in 1862, and rebuilt in 1888; 4 Siemens heating furnaces, 7 direct air-heating furnaces, 14 reducing furnaces for making iron direct from the ore, one puddle mill with rotary squeezer, two 15-gross-ton Lash open-hearth furnaces, and 3 trains of rolls (one guide mill, one 16-inch, and one 22-inch universal, 36 inches wide); product, universal rolled plates and bars for structural purposes, and general merchant work on small mills; annual capacity, 40,000 net tons. Fuel used, natural gas exclusively. Building 8 reducing furnaces and two 30-ton Lash open-hearth furnaces. C. M. Raymond, President; H. W. Lash, General Manager; Matthew Graff, Vice-President; John D. Slayback, Treasurer; William Brandreth, Secretary; Millard Hunsiker, Assistant Secretary and General Agent.

Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Three mills in Allegheny county. Homestead Steel Works, at Munhall Station, formerly operated by the Pittsburgh Bessemer Steel Company Limited. Built in 1880-1; two 5-gross-ton converters; first blow made March 19, 1881; first steel rail rolled August 9, 1881; one 28-inch blooming mill, one 23-inch and one 33-inch train for structural shapes, one 10-inch mill, one 32-inch slabbing mill for rolling heavy ingots, and one 120-inch plate mill for rolling high grade boiler steel and ship and tank plate. Open-hearth steel plant completed and put in operation in October, 1886; one 15-gross-ton, four 20-gross-ton, and two 35-gross-ton Siemens-Martin furnaces. Ground has been broken for eight additional 15-gross-ton open-hearth furnaces. Product, blooms, billets, structural shapes, bridge steel, best boiler plates, armor plate, and ship and tank plate; annual capacity, 180,000 net tons of Bessemer steel ingots, 40,000 tons of steel plates, and 75,000 tons of miscellaneous steel products. Fuel used, natural gas exclusively. J. A. Potter, Superintendent. Upper Union Mills, at Thirty-third st. Built in 1862; 42 single puddling furnaces, 13 single and 5 double Siemens heating furnaces, and 8 trains of rolls (one 8, one 12, four 18, and two 20-inch); product, structural iron and steel, iron and steel bars, iron and steel universal mill plates, light steel rails, and special shapes; annual capacity of iron and steel, 80,000 net tons. Fuel used, natural gas exclusively. H. W. Borntraeger, Superintendent. Lower Union Mills, Twenty-ninth st., formerly operated by

Wilson, Walker & Co. Limited. First put in operation in 1862; 42 single puddling furnaces, 18 heating furnaces, 6 trains of rolls, (2 universal, one 10, one 15, one 18, and one 20-inch,) 25 forge fires, and 16 hammers (700 to 7,000 pounds); product, universal mill plates, railway forgings, bridge work, structural shapes, axles, links and pins, and bar iron; annual capacity of iron and steel, 50,000 net tons. H. W. Borntraeger, Superintendent. Fuel used, natural gas exclusively. Wm. L. Abbott, Chairman; H. M. Curry, Vice-Chairman; L. C. Phipps, Treasurer; Otis H. Childs, Secretary; Wm. P. Palmer, General Sales Agent. *See Beaver Falls Mills, Western Pennsylvania district. See Lucy Furnaces.*

Chartiers Iron and Steel Company Limited, Iron Exchange, Wood and Water sts., Pittsburgh. Works at Putnam P. O., (Mansfield Valley telegraph office,) Allegheny county. Built in 1883-4, and put in operation August 13, 1884; 4 single puddling furnaces, 11 heating furnaces, 3 trains of rolls, and one 4-ton hammer; product, sheet iron and sheet steel; annual capacity, 5,000 net tons. Brand, "Chartiers." Fuel used, natural gas exclusively. John C. Kirkpatrick, Chairman; D. A. Carter, Secretary; M. W. Leech, Treasurer; John Henry, Superintendent.

Clinton Rolling Mill, Clinton Iron and Steel Company, Pittsburgh. Mill on the South Side. Built in 1846; 7 double and 19 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 42 nail machines. Product, bars, sheets, and plates; total annual capacity, 35,000 net tons. Fuel used, natural gas exclusively. J. W. Friend, President; F. N. Hoffstot, Treasurer. *See Furnaces.*

Crescent Steel Works, Crescent Steel Company, 136 First avenue, Pittsburgh. Works, Forty-ninth to Fifty-first sts. Built in 1865; 32 heating furnaces, 6 annealing furnaces, 9 trains of rolls, one 60-pot, two 36-pot, and two 24-pot Siemens steel-melting furnaces, and 18 hammers. Bessemer steel plant built in 1889; two 2-ton converters; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 12,000 net tons. Brand, "Crescent." Also have a forge for making iron for their own use, a drill-rod shop, a wire shop, and a shop for making coiled springs. Fuel, natural gas, coal, and coke. Works under same management as when operated in name of Miller, Metcalf & Parkin.

Eagle Rolling Mill and Tube Works, J. W. Friend & Co., Carson st., Thirty-fourth ward, South Side, Pittsburgh, Allegheny county. Built and put in operation in 1848; 17 single and 4 double puddling furnaces, 4 steel-heating furnaces, and 3 trains of rolls (one 16 and two 20-inch); during July, 1884, a plant for the production of tubes was built; product, muck bar, bar iron, skelp iron, plow steel, and wrought-iron pipe; daily capacity, double turn, 45 net tons. Brand, "Eagle." Fuel used, natural gas exclusively.

Edgar Thomson Steel Works, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Began operations in August, 1875; four 10-gross-ton converters, 6 pig-iron cupolas and 4 spiegel cupolas, 22 Siemens heating furnaces, one 3-high 38-inch blooming mill, one shear and one 3-ton hammer for shearing and clipping blooms, two 3-high rail trains, (one 23 and one 24-inch,) and hot-saw and finishing machinery; forge, containing one 6-ton hammer and 2 heating furnaces, and machine and smith shops attached; product, only Bessemer steel in the several forms of rails, blooms, and billets; daily capacity, double turn, 1,300 gross tons of ingots, 1,050 gross tons of rails, and 300 gross tons of billets. First blow made August 25, 1875, and first rail rolled September 1, 1875. Brand, "Edgar Thomson Steel." Use the best quality of Bessemer pig iron, containing not over 0.1 per cent. of phosphorus; natural gas exclusively used under boilers and in heating furnaces. H. C. Frick, Chairman; J. G. A. Leishman, Vice-Chairman and Treasurer; F. T. F. Lovejoy, Secretary; Charles M. Schwab, General Superintendent. *See Furnaces.*

Elba Iron Works, H. Darlington, lessee, Laughlin's Station, Baltimore and Ohio Railroad, Pittsburgh. Built in 1862; 30 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 8, one 10, one 18-inch, and one muck train); product, skelp and socket iron; annual capacity, 26,000 net tons. Fuel used, natural gas exclusively. Owned by the Elba Iron and Bolt Company Limited.

Etna Iron Works, Spang, Chalfant & Co., Pittsburgh. Works at Etna, Allegheny county. Office, 66, 68, and 70 Sandusky st., Allegheny City. Built in 1828; one double and 27 single puddling furnaces, 9 heating furnaces, 5 trains of rolls, (one 8, one 12, and one 16-inch, one sheet train, and one muck train,) and one hammer; product, bar and pipe iron; annual capacity, 14,000 net tons. Also make all kinds of wrought-iron pipe. This was the first mill to use natural gas exclusively; it still uses it exclusively. George A. Chalfant, Manager.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Open-hearth steel works added in 1882, and started in August of that year; new steel foundry erected in 1887, and started in September of that year; two 12-gross-ton and two 20-gross-ton Siemens open-hearth furnaces; product, steel castings; annual capacity, 18,000 net tons. Fuel used, natural gas exclusively. Use no miscellaneous steel scrap of any kind. James Hemphill, Chairman; W. Wade, Secretary; Pen-nock Hart, Treasurer; N. A. Hemphill, Superintendent.

Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Built in 1857; 32 heating furnaces, 27 railroad spike machines, and 7 trains of rolls, (four 8, one 9, and two 16-inch,) three trains being continuous trains for spike iron; product, railroad and marine spikes; annual capacity, 50,000 net tons. Brand, "Dilworth, Porter & Co."

- Fuel used, natural gas. Charles R. Dilworth, Chairman; Samuel T. Owens, Vice-Chairman; Joseph R. Dilworth, Secretary and Treasurer. Hainsworth Steel Company, Pittsburgh. Bessemer steel plant built in 1881; one 5-gross-ton converter; first blow made August 26, 1881; one equalizing pit, one heating furnace, billet mill, slab mill, 200-ton Hainsworth hydraulic forging press, and one 5-ton hammer; product, steel castings and billets; annual capacity, 67,000 net tons. Fuel used, natural gas. (Formerly operated by the Pittsburgh Steel Casting Company.) George T. Oliver, President; W. T. Sanger, Vice-President, Secretary, and Treasurer.
- Howe, Brown & Co. Limited, Penn avenue and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 14 hammers, with 20 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 Siemens steel-melting furnaces, 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, 12,000 net tons of ingots. The open-hearth steel department has one 35-gross-ton Siemens furnace, built in 1886; product, spring, plow, and machinery steel, and plates for boilers, hulls of vessels, etc.; annual capacity, 8,000 net tons of plates, 2,000 net tons of machinery steel, 2,000 net tons of plow steel, and 500 net tons of spring steel. Adding another open-hearth furnace. Fuel used, natural gas exclusively. James W. Brown, Chairman; W. R. Howe, Vice-Chairman; Geo. A. Howe, Secretary; T. H. Childs, Treasurer. Branch offices: 127 Oliver st., Boston; 228 Lake st., Chicago; 12 Cliff st., New York.
- Hussey, Binns & Co. Limited, Pittsburgh. Steel plant built in 1875; one 24-pot Siemens steel-melting furnace, 4 sets of rolls, 18 heating furnaces, one steam hammer, 3 helve hammers, and numerous machines used in shovel-making; product, crucible cast steel, used by the firm in making shovels, spades, and scoops; annual capacity, 1,500 net tons ingots. Fuel used, natural gas exclusively. Edward B. Alsop, Chairman; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent. Intend to remove works to Jeannette, Westmoreland county, in 1890.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Established in 1824; 29 single puddling furnaces, 17 heating furnaces, 4 annealing furnaces, 4 furnaces for heating nail plates, one furnace for annealing nails, 11 hammers, 9 trains of rolls, (2 muck trains, one 16 and one 8-inch bar, 2 sheet trains, 31 x 112-inch plate train, nail-plate train, and blooming-mill train,) 92 nail machines, and 4 horse-shoe machines; two 12-gross-ton Siemens-Martin open-hearth steel

- furnaces, one built in 1879 and one built in 1881; annual capacity, 12,000 net tons; one 6-gross-ton Bessemer converter, with modern appliances; first blow made March 15, 1886. Product, steel boiler plate, sheet steel, plate steel, fire-box steel, horse-shoe bar, horse and mule shoes, steel blooms, nails, and sheet and plate iron; annual capacity, 90,000 net tons. Brand of nails and horse and mule shoes, "Juniata;" of horse-shoe bar, "Shoenberger;" of sheet and plate iron, three grades, "Penn," "Charcoal," and "Juniata." Fuel used, natural gas exclusively. Propose adding another 6-ton Bessemer converter.
- Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Built in 1828; 20 single puddling and scrapping furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar, sheet, and plate iron, flat rails, and 12 to 30-lb. T rails; annual capacity, single turn, 6,000 net tons. Fuel used, natural gas exclusively.
- Keystone Rolling Mill, Keystone Rolling Mill Company Limited, Pittsburgh. Built in 1865; 36 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls; product, skelp, axe, and bar iron; annual capacity, 25,000 net tons. Brand, "Keystone." Fuel used, natural gas exclusively. James McCutcheon, Chairman; N. M. McDowell, Secretary; James H. McCutcheon, Treasurer; Thomas Venners, Superintendent.
- La Belle Steel Works, Smith Brothers & Co., Pittsburgh. Built in 1863; two 25 and two 30-ton converting furnaces, one single and 2 double puddling furnaces, 22 forge fires, 21 heating furnaces, one large Swindell gas heating furnace, one 36-pot and two 42-pot Siemens gas steel-melting furnaces, 13 hammers, 6 trains of rolls, (one 9, one 10, one 14, one 16, one 20, and one 24-inch,) and two 15-gross-ton Siemens open-hearth steel furnaces, one built in 1886 and one built in 1887; product, merchant steel of every description; also, rake teeth for sulky rakes, springs, and iron and steel axles; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and 93 Liberty st., New York; C. E. James & Co., Chattanooga, Tenn.; Rice Lewis & Son, Toronto, Canada.
- Liggett Spring and Axle Company Limited, Pittsburgh. Works at Spruce and Market sts., Allegheny City. Built in 1865 and 1882; 5 double and 3 single heating furnaces, one 16-inch train of rolls, and 11 hammers; rolling-mill machinery used to reroll iron and steel into shapes for the manufacture of springs and axles; product, buggy and wagon springs and axles; annual capacity of finished material, 3,900 net tons. Fuel used, natural gas exclusively. Thomas M. Erwin, Treasurer.
- Linden Steel Company Limited, general office and works, Linden Station, Second avenue, Pittsburgh, B. & O. R. R. Down-town office, Lewis Block. Open-hearth steel works, built in 1879, contains one 25-

gross-ton, one 15-gross-ton, and one 10-gross-ton Siemens open-hearth steel furnace, 16 heating furnaces, blooming mill, one 31 x 108-inch plate mill, one 18-inch bar mill, one 20-inch sheet train, two 10-inch trains, 6 hammers, and cold-condensed-shafting machinery; product, open-hearth steel ingots, blooms, billets, and slabs; rounds, squares, and flats; boiler, tank, armor, and ship plates; sheets, tool, spring, tire, and agricultural steel, and cold-condensed shafting; unusual shapes a specialty; daily capacity, double turn, 75 net tons. Brand, "Linden." Fuel used, natural gas exclusively. W. J. Lewis, President; Henry Lloyd, Vice-President; Cephas Taylor, Secretary; M. D. W. Loomis, Treasurer; Richard Hurrell, Manager.

McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport, Allegheny county. Branch office, 111 Water st., Pittsburgh. Built in 1851; 17 forge fires, 12 single puddling furnaces, 22 heating furnaces, 9 trains of rolls, and 10 hammers; product, sheet iron, both common and planished; specialty, patent planished sheet iron; annual capacity, 10,000 net tons. Trade-mark, a Russian bear in the talons of an American eagle. Fuel used, natural gas exclusively. W. Dewees Wood, President; Richard G. Wood, Vice-President; Alan W. Wood, Secretary and Treasurer; Thomas D. Wood, Superintendent.

Millvale Rolling Mill, Millvale Iron Company Limited, lessee, Pittsburgh. Branch office, 112 Water st. Mill at Bennett Station, on W. P. R. R. Built in 1850, burned December 11, 1881, and rebuilt in 1882; 10 Danks rotary puddling furnaces, 4 double, one double-double, and 21 single puddling furnaces, 18 heating furnaces, 10 trains of rolls, and one hammer. Open-hearth steel plant built in 1886; two 15-gross-ton Siemens-Martin open-hearth furnaces; steel blooming mill, with a 31-inch plate mill, and a universal mill for reworking material for structural iron, built in 1887-8. Product, iron and steel plates; total annual capacity, 55,000 net tons. Fuel used, natural gas exclusively. J. W. Friend, Chairman; F. N. Hoffstot, Secretary and Treasurer.

National Tube Works Company, McKeesport, Allegheny county. Five mills. National rolling mill No. 1 was built in 1879; 15 Siemens double puddling furnaces, 10 heating furnaces, 2 sets of 3-high muck rolls, one plate mill, and one continuous mill; one 18-gross-ton Siemens open-hearth steel furnace added in 1886. National rolling mill No. 2 was built in 1882; 18 single puddling furnaces, one heating furnace, one set of slab rolls, and two 8-ton steam hammers. National rolling mill No. 3 was built in 1886; 42 single puddling furnaces and two sets of 3-high muck rolls. National rolling mill No. 4 was built in 1887; 6 heating furnaces, one 13-inch and one 24-inch train of rolls; extra puddle mill added in 1888-9, with 20 single puddling furnaces and one universal train of muck rolls.

Finished product of the foregoing mills, boiler tube and pipe iron. Total annual capacity of the above described mills, 100,000 net tons. Brand, "National." National Forge and Iron Works were built in 1881; 16 forge fires, one run-out fire, two hammers, one heating furnace, and one set of slab rolls; product, blooms and billets for boiler tubes and boiler plate; annual capacity, 12,000 net tons. Fuel used, natural gas exclusively, from the company's own lines. James C. Converse, President; P. W. French, Secretary; William S. Eaton, Treasurer; E. C. Converse, General Manager. Department of supplies, C. I. O'Connor. Superintendent of rolling mills, J. R. Jackson.

Nellis's Agricultural Works, Pittsburgh. Built in 1870; 6 forge fires, 9 heating furnaces, 6 hammers, and five 4-pot steel-melting holes; the spring department contains one Nellis tempering and annealing furnace. Fuel, natural gas. Idle.

Oliver and Roberts Wire Company Limited, Pittsburgh. Built in 1884, and first put in operation June 12, 1884; 3 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); product, wire rods, drawn into wire by the same company; annual capacity, 40,000 net tons. Fuel used, natural gas exclusively. Henry W. Oliver, Jr., Chairman; George T. Oliver, Vice-Chairman; William H. Cassidy, Secretary and Treasurer; Henry Roberts, General Superintendent.

Pennsylvania Iron and Steel Works, W. J. Hammond & Sons, Pittsburgh. Built in 1843; 14 single puddling furnaces, one train of rolls, and one 15-gross-ton open-hearth steel furnace; first steel made in January, 1886; product, muck bar; annual capacity, 11,500 net tons of muck bar. Fuel used, natural gas exclusively. Sheet mill burned in July, 1887. Steel plant not in operation. W. J. Hammond, President.

Pittsburgh Forge and Iron Company, Tenth st. near Penn ave., Pittsburgh. 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 (two 800-lb., 5 one-ton, two 3-ton, and two 4-ton); product, bolts, nuts, bar iron, splice bars, draw bars, links and pins, arch bars, shaped iron, and hammered car and locomotive axles; total annual capacity, 29,000 net tons. Brands, "P. F. & I." and "Special." Fuel used, natural gas. Calvin Wells, President and Treasurer; James K. Verner, Secretary and selling agent; Joseph Kaylor, Manager.

Pittsburgh Iron Works, J. Painter and Sons Company, Pittsburgh. Built in 1836; 67 single puddling furnaces, 15 heating furnaces, and 13 trains of rolls (six 8-inch, three 10, one 12, one 16, and two 20-inch); product, principally oil, whisky, and trunk hoops, also hoops for pails, tubs, and wooden ware, cotton-ties, lock iron, stone saws, merchant bands, and hinge iron; annual capacity, 40,000 net tons. Brand, "Painter." Fuel used, natural gas exclusively. A. E. W.

Painter, President; Jacob Painter, Jr., Secretary; C. K. Reppert, Treasurer.

Pittsburgh Steel Casting Company, Twenty-sixth and Railroad streets, Pittsburgh. Built in 1871; two 24-pot and one 18-pot Siemens steel-melting furnaces, one 24-pot coke steel-melting furnace, and 7 annealing furnaces; product, crucible steel castings; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively. (Bessemer plant sold to the Hainsworth Steel Company.) Wm. G. Johnston, President; Clarence P. Tiers, Vice-President; Augustus Trump, Secretary and Treasurer; Stewart Johnston, Superintendent.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. Established in 1845; works at Chartiers, P. & L. E. R. R.; present works built in 1882-3; 15 heating furnaces, 3 trains of rolls, (20 and 16-inch and combined 10 and 12-inch,) and 5 hammers, ranging from 750 pounds to 7 tons; two 33-pot Siemens steel-melting furnaces; first crucible steel melted April 11, 1883; one 20-gross-ton open-hearth steel furnace completed in June, 1886; 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, and forgings and springs of all shapes and qualities; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. Arranging to obtain natural gas from their own territory. David Shaw, Superintendent. Sole proprietors, Herbert DuPuy and David Shaw. Selling agents, M. T. Miles & Son, Chicago; McCargo & Crowell, Philadelphia; H. J. Hopper, New York.

Reliance Steel Casting Company Limited, Pittsburgh. Built in 1889; one 18-pot steel-melting furnace; first steel made in September, 1889; product, crucible steel castings; annual capacity, 400 tons. Fuel used, natural gas. Charles Bailey, Chairman; Joseph A. Kelly, Secretary and Treasurer.

Republic Iron Works, Twenty-fifth st., South Side, Pittsburgh. Built in 1863; 26 single and 12 double puddling furnaces, 14 heating furnaces, 4 sheet furnaces, 10 forge fires, and 9 trains of rolls (one 13, one 16, two 20, three 22, one 24-inch, and one 3-high plate train); product, boiler tube and pipe iron and sheet and plate iron; annual capacity, - 30,000 net tons of boiler tube and pipe iron, 5,000 net tons of sheet iron, and 7,500 net tons of plate iron. Brand, "Republic." An extensive galvanizing department is connected with the works. Fuel used, natural gas exclusively. E. C. Converse, President; Horace Crosby, Treasurer and General Manager.

Sable Iron Works, Zug & Co. Limited, Pittsburgh. Built in 1845; 38 single puddling furnaces, 11 heating furnaces, 6 trains of rolls (one 8, one 10, and one 16-inch, one universal mill, one 18-inch nail-plate mill, and 3 sets 3-high 20-inch muck train); product, merchant bar iron, including heavy sizes of flat bars and squares made on the uni-

versal rolls, and fine grade horse-shoe bar; annual capacity, 25,000 net tons of rolled iron. Fuel used, natural gas exclusively. Brand, "Sable." Charles H. Zug, Chairman; A. F. Keating, Treasurer; T. C. Clarkson, Secretary. Eastern sales agents, E. T. Day, New York; William M. Horne & Co., Boston.

Singer, Nimick & Co. Limited, Pittsburgh. Built in 1848; 8 single puddling furnaces, 8 converting furnaces, 14 steam hammers, one train of muck rolls, 4 trains of bar rolls, 5 trains of sheet rolls, and one 10-gross-ton Siemens open-hearth steel furnace; crucible steel works with capacity of 258 pots at each heat; total annual ingot capacity, 23,000 net tons; product, tool, saw, boiler, and agricultural steel; also carriage springs and axles and cold-rolled steel. Fuel used, natural gas exclusively. W. H. Singer, Chairman; George Singer, Jr., Secretary and Treasurer. General agents for the Eastern States, Hogan & Son, 243 Pearl st., New York.

Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 34 single puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (12, 16, 18, 24, and 30-inch); product, bars, angles, sheets, and plates, and light T rails; boiler plates a specialty; make "Sligo" bars and "Tyrone" refined iron; boiler heads and flue holes flanged to order; annual capacity, 16,000 net tons. Fuel used, natural gas.

Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Built in 1859; 30 single puddling furnaces, 2 scrap furnaces, 6 single and 2 double heating furnaces, 4 sheet furnaces, 4 pair furnaces, 5 annealing furnaces, 10 trains of rolls, (include a train capable of rolling plates 12 inches thick, 7 feet wide, and 15 tons in weight,) and 2 hammers; product, "C. H. B." galvanized iron, Juniata, charcoal, and common sheet and plate iron, and skelp iron sheared and grooved; annual capacity, 35,000 net tons. Open-hearth steel department contains two 15-gross-ton open-hearth steel furnaces; first steel made November 29, 1883; product, steel plate; annual capacity, 18,000 net tons. Fuel used, natural gas exclusively. *See Furnaces.*

Solar Iron and Steel Works, William Clark's Son & Co., Pittsburgh. Built in 1869; 24 single puddling furnaces, 9 heating furnaces, and 6 trains of rolls (one 7-inch hoop, two 8-inch hoop, one 9 and one 12-inch bar, and one 20-inch muck); product, hoop, band, box, and scroll iron and steel, and cotton-ties; annual capacity, 15,000 net tons. Brands, "Solar" and "Clark." Fuel used, natural gas exclusively. Erecting an open-hearth steel plant of two furnaces.

Spang Steel and Iron Company Limited, Pittsburgh. Works at Etna, Allegheny county. Built in 1880-1; three 10-gross-ton Siemens-Martin open-hearth steel furnaces, 7 heating furnaces, one hammer, and 4 trains of rolls (one 30-inch bloom, one 30-inch universal, one 18-inch bar, and one 112 x 31-inch plate); product, steel boiler, ship, and tank plates, and machinery and spring steel; annual capacity, 30,000

net tons. Two 3-ton Clapp-Griffiths steel converters built in 1886-7; first blow made March 1, 1887. Fuel used, natural gas exclusively. Campbell B. Herron, Chairman; John C. Porter, Secretary and Treasurer; George A. Chalfant, Manager. Selling agents, William H. Wallace & Co., New York; George O. Wales & Co., Boston; Esherick, Cotton & Co., Philadelphia; Ducharme, Fletcher & Co., Detroit; Bassett & Presley, Cleveland; Winne & Jackman, Chicago.

Star Iron Works, Lindsay & McCutcheon, 98 Rebecca st., Allegheny City. Built in 1862; 37 single puddling furnaces, 10 heating furnaces, and 8 trains of rolls (three 8, one 10, one 12, and one 16-inch, and two muck trains); product, hoop, band, and horse-shoe iron; also manufacture a full line of strap and T hinges and wrought iron washers; annual capacity of rolled iron, 12,000 net tons. Brand, "Star." Fuel used, natural gas.

Sterling Steel Company, 208 Wood st., Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; two 24-pot Siemens steel-melting furnaces, 6 heating furnaces, and 4 hammers (800 to 2,500 pounds); product, fine crucible tool steel; annual capacity, 3,000 net tons. Brand, "Sterling." Use natural gas for fuel. Formerly called Pitt Steel Works. C. Y. Wheeler, President; C. W. Mackey, Vice-President; A. S. Beymer, Treasurer; John S. Lyon, Secretary. Selling agents, Vought & Williams, New York; D. H. Corinth and Hand, Burr & Co., Philadelphia; McBarron & Maxwell, Boston; William G. Wetherall, Baltimore; S. D. Kimbark, Chicago; Fulton, Conway & Co., Louisville; George W. Gibbs & Co., San Francisco.

United States Iron and Tin Plate Works, United States Iron and Tin Plate Company Limited, Demmler P. O., near McKeesport, Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Built in 1873-4; burned and rebuilt in 1883; 5 single puddling and 3 heating furnaces, 4 knobbling fires, 4 double sheet-mill furnaces, 5 annealing furnaces, 2 tinning stacks, (not in operation at present,) one hammer, one train of bar rolls, 4 trains of sheet rolls, and 3 sets of cold rolls; product, specialties in refined and charcoal polished black sheet iron and Bessemer steel sheets and plates, also sheet-iron dripping pans; annual capacity for black plates and tinplates, 6,000 net tons. Black plates branded "U. S. A. M." and "J. H." Fuel used, natural gas exclusively. W. C. Cronmeyer, Chairman; F. E. Schenck, Secretary and Treasurer; A. J. Demmler, Superintendent. Eastern agents, Ely & Williams, Philadelphia and New York.

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Works at Sharpsburg, Allegheny county. Office, 64, 66, and 68 Anderson st., Allegheny City. Built in 1846; 28 single puddling furnaces, 10 heating furnaces, one 4-ton hammer, 7 trains of rolls, (two 8, one 15, two 18, one 20, and one 24-inch,) and 50 nail machines; product, bar, skelp, sheet, and plate iron, and nails; annual capacity, 105,000

kegs of nails and 25,000 net tons of rolled products. Brand, "Vesuvius." Fuel used, natural gas. George T. Lewis, Manager.

Vulcan Forge and Iron Works, Long & Co., Pittsburgh. Works at Chartiers Station. Forge built in 1877; rolling mill built in 1882; 20 single puddling furnaces, 5 forge fires, 2 upsetting machines, 7 heating furnaces, 3 trains of rolls, (9, 15, and 18-inch,) and 4 hammers; product, bar iron, bridge iron, and iron and steel forgings, including axles; annual capacity, 12,000 net tons of finished rolled iron and 3,500 net tons of forgings. Brands, "Vulcan" and "L. & Co." Fuel used, natural gas exclusively.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1829; 28 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, 5 hammers, one 36-pot and seven 18-pot steel-melting furnaces, and one 45-ton cementing furnace; product, merchant bar iron, iron boiler plate, and rolled and hammered crucible steel; annual capacity, 15,000 net tons of iron and 7,000 net tons of crucible steel. Brands, "Wayne" and "U. S." Fuel used, natural gas exclusively.

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 60. Of these 7 make Bessemer steel, 2 make Clapp-Griffiths steel, 15 make open-hearth steel, 12 make crucible steel, and one makes blister steel.

WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

Apollo Rolling Mills, Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Built in 1850; 12 single puddling furnaces, 3 bar furnaces, 5 heating furnaces, 6 annealing furnaces, one 6-ton hammer, and 10 pairs of rolls; two 15-gross-ton open-hearth steel furnaces, built in 1885-6, first steel made June 15, 1886; product, galvanized and smooth-finished iron and steel sheets; annual capacity, 15,000 net tons. Brand, "Apollo." Fuel used, natural gas exclusively. George G. McMurtry, Chairman; Wm. B. Rhodes, Secretary; W. P. Bache, Treasurer.

Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Pittsburgh office, McClintock Building, Market st. Built in 1886; new mill added in 1889; 8 heating furnaces, 3 annealing furnaces, 2 sets of roughing rolls, 3 sets of finishing rolls, 2 pairs of cold rolls, and one set of bar rolls; product, fine sheet iron and decarbonized sheet steel; annual capacity, 5,000 net tons. Fuel used, natural gas exclusively. P. H. Laufman, Chairman; W. B. Laufman, Secretary; S. M. Jackson, Treasurer; S. A. Gourley, Superintendent.

Arethusa Iron Works, George W. Johnson, New Castle, Lawrence county. Built in 1873; 3 double and 13 single puddling furnaces, 9 heating furnaces, 4 trains of rolls, (three 21 and one 24-inch,) one hammer, and one squeezer; product, plate and sheet iron; annual capacity,

13,000 net tons. Fuel used, part coal and part natural gas. George W. Hartman, Bookkeeper; Jacob James, Superintendent.

Beaver Falls Mills, Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Works at Beaver Falls, Beaver county, formerly operated by the Hartman Steel Company Limited. Built in 1883, and first put in operation September 1, 1883; 6 large heating furnaces; the merchant steel department contains 4 heating furnaces and 3 trains of rolls (10, 12, and 18-inch); the rod department contains 2 heating furnaces and a combination rod train; product, steel wire rods, merchant steel bars, tire steel, and wire nails; annual capacity, steel department, 30,000 net tons; wire-rod department, 30,000 net tons. Wire mill produces fence and merchant wire, plain and galvanized; annual capacity, 30,000 net tons. Use producer gas for heating furnaces, and coal in other departments. F. G. Tallman, Superintendent. See *Carnegie, Phipps & Co. Limited, Allegheny county. See Lucy Furnaces.*

Beaver Falls Steel Works, Beaver Falls, Beaver county. Built in 1875; one 24-pot Siemens 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, 1,600 net tons. Brand, "Beaver." Fuel used, natural gas. James M. May, Treasurer and Superintendent.

Cambria Iron and Steel Works, Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Built in 1853; 9 Siemens and 42 reverberatory heating furnaces, one 7-ton, one 5-ton, one 3-ton, three 6,000-pound, one 3,500-pound, and one 2,500-pound hammer, and the following trains of rolls: One 24-inch and one 21-inch rail mill, 3 sets each; two 21-inch bar mills, 3 sets each; 12-inch splice-bar mill, 3 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 6 sets; 2 rod trains, 9 sets; 48-inch blooming mill, one set; 40-inch blooming mill, one set; total, 35 sets. Bessemer steel works made their first blow July 10, 1871; two 9-gross-ton converters; annual capacity, 200,000 net tons of ingots. New Bessemer plant completed in April, 1889; two 11½-gross-ton converters. Two 20-gross-ton Siemens open-hearth steel furnaces, with the Pernot improvement, built in 1878-9; one 12-ton Krupp washer, which can be used as an open-hearth furnace by changing bottom; annual capacity, 25,000 net tons of ingots. Product, steel rails, splice bar, angles, flats, rounds, axles, billets, and wire rods; capacity of finished steel per annum, 225,000 net tons steel rails and 75,000 net tons steel in other shapes. Have been using natural gas for fuel since November, 1886. Officers in Philadelphia: E. Y. Townsend, President; Powell Stackhouse, Vice-President; John W. Townsend, 2d Vice-President; William S. Robinson, Secretary and Treasurer; Harvey Ellis, Assistant

Treasurer; A. P. Robinson, Assistant Secretary. Officers at Johnstown: John Fulton, General Manager; Cyrus Elder, Solicitor and General Agent. *See Gautier Steel Department of Cambria Iron Company. See Furnaces.*

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, 421 Wood st., Pittsburgh. Built in 1882; 4 single puddling furnaces, 4 knobbling fires, 9 heating furnaces, 2 trains of rolls, one 5-ton hammer, and 3 annealing furnaces; product, finest quality of sheet iron and steel for stamping purposes and galvanizing; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively, from the company's own wells, adjoining the mill. C. Meyran, President; John Ewing, Vice-President; L. A. Meyran, Secretary and Treasurer; H. S. Duncan, Business Manager; J. F. Budke, General Superintendent of works.

Columbia Iron and Steel Company, 132 First ave., Pittsburgh. Works at Uniontown, Fayette county. Built in 1886-7; two 5-gross-ton Bessemer steel converters, 2 soaking pits, one 32-inch blooming mill, one 28-inch train and one 18-inch train of rolls, and 4 heating furnaces; first blow made in steel works September 1, 1887; product, blooms, billets, slabs, beams, channels, angles, tees, bars, and special shapes for architectural and engineering purposes; daily capacity in steel ingots, 150 to 250 net tons. C. Yeager, President; E. M. Butz, Vice-President and Treasurer; R. J. Butz, Secretary.

Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. Built in 1879; rebuilt in 1884; 2 single puddling furnaces, 2 heating furnaces, one 16-inch train of rolls, and 4 hammers; crucible steel department has six 6-pot steel-melting holes; product, refined blooms, special tool steel, and a self-hardening tool steel. Fuel used, natural gas exclusively.

Etna Iron Works Limited, New Castle, Lawrence county. Consolidation, November 1, 1874, of Etna Iron Company and Onondaga Iron and Nail Company; 2 double and 21 single puddling furnaces, 5 heating furnaces, 55 nail machines, and 4 trains of rolls (one 8, one 16, and two 18-inch); product, nails, merchant bar iron, and pipe iron; annual capacity, 120,000 kegs of nails and 12,000 net tons of bar and pipe iron. Fuel used, natural gas and coal, principally the latter. T. M. Sweeny, Chairman and Manager; A. W. Thompson, Secretary. *See Shenango Valley Furnaces.*

Gautier Steel Department of Cambria Iron Company, (formerly Gautier Steel Company Limited,) Johnstown, Cambria county. Works erected in 1878; damaged by flood in May, 1889, and partly rebuilt in same year. Rolling mill has 5 trains of rolls, (one 9, two 12, one 16, and one 20-inch,) with full equipment of furnaces, shears, hammers, and special machinery; product, merchant bar steel of every size and for every purpose, the specialties being tire, spring, toe-calk, machinery, and

plow steels, finger bars, and rake teeth; annual capacity, 45,000 net tons. Production of separate departments: Plow shapes and slabs, annual capacity, 7,000 net tons; finished plow steels, 3,000 tons; tire steel, 4,000 tons; spring steel, 12,000 tons; machinery steel, 1,500 tons; harrow teeth, 1,200 tons; horse-rake teeth, 100,000 sets; steel finger-bars, 125,000 bars; cold rolled steel, 3,000 tons. Use natural gas for fuel. The wire mill, which was partially destroyed by the flood, and had an annual capacity of 30,000 net tons, could readily be replaced. Branch offices: 104 Reade st., New York; southwest corner Sixth and Arch sts., Philadelphia; Phenix Building, Chicago. *See Cambria Iron and Steel Works.*

Greensburg Steel Company, Greensburg, Westmoreland county. Building a steel works to contain 2 forge fires, 4 heating furnaces, 3 hammers, (1,000-lb., 1,500-lb., and 2-ton,) and one 24-pot steel melting furnace; product to be crucible steel for cutlery, edge tools, etc.; annual capacity, 1,500 net tons. Will use natural gas for fuel. James C. Clarke, Treasurer; A. C. Isaacs, Manager.

Johnson Company, Johnstown, Cambria county. Built in 1887-8, and first put in operation May 13, 1888; 7 heating furnaces and one 26-inch train of rolls. Open-hearth steel department started in September, 1889; one 2-ton Lash open-hearth furnace, using natural gas for fuel; annual capacity, 2,000 net tons of special quality Mitis ingots and heavy castings. Crucible department started in August, 1888; four 12-pot Mitis furnaces, using petroleum for fuel; annual capacity, 400 net tons of Mitis switch castings. Product of the works, girder rails and street railroad specialties entirely; annual capacity, 90,000 net tons. Also operate switch and drop-forging works. Arthur J. Moxham, President; Tom L. Johnson and Daniel Coolidge, Vice-Presidents; W. McLain, Secretary; Max M. Suppes, Manager.

Kimberly (P. L.) & Co., Sharon, Mercer county. Two mills: Atlantic Iron and Nail Works, at Sharon, Mercer county, built in 1867; 32 puddling furnaces, 8 heating furnaces, 6 trains of rolls, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 20,000 net tons. Greenville Rolling Mill, at Greenville, Mercer county, built in 1871; 26 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, hoop and band iron; annual capacity, 12,000 net tons. Use natural gas for fuel at Sharon. *See Shenango Valley Furnaces.*

Kittanning Iron Company Limited, Kittanning, Armstrong county. Built in 1848, rebuilt in 1880; 33 single puddling furnaces, using natural gas, 5 heating furnaces, and one 3-high 22-inch train; product, muck bar; annual capacity, 18,000 net tons. Fuel used, natural gas exclusively. James Mosgrove, Chairman; Henry A. Colwell, Secretary and Treasurer; Charles T. Neale, General Manager. *See Bituminous Furnaces.*

- Latrobe Steel Works, Latrobe, Westmoreland county. Branch office, 251 South Fourth st., Philadelphia. Built in 1888-9, and put in operation in August, 1889; 7 heating furnaces, one train of tire rolls, and 3 hammers (1,150-lb., 7-ton, 20-ton); open-hearth steel department contains two 20-gross-ton Siemens-Martin furnaces; first steel made August 5, 1889; annual capacity, 18,000 net tons of ingots. Product, locomotive and car-wheel tires; annual capacity, 15,000 net tons. Brand, "Latrobe." Fuel used, natural gas. Marriott C. Smyth, President; Walter H. Bryant, Secretary; Ellwood W. Kimber, Treasurer; Guillaem Aertsen, Manager; Julian Kennedy, Chief Engineer; J. K. Griffith, Superintendent.
- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Iron Exchange Building, Wood and Water sts., Pittsburgh. Built in 1872; 5 single puddling furnaces, 4 knobbling fires, 11 heating furnaces, 4 trains of rolls, and one hammer; one 10-ton open-hearth steel furnace erected in 1884; product, finest quality of stamping irons, and tea-tray, show-card, spoon, shovel, trunk, Juniata, pan and elbow, and lock iron, and cold-rolled sheet steel; annual capacity, 5,000 net tons. Fuel used, natural gas exclusively. Brand, "Leechburg." John C. Kirkpatrick, Chairman; M. W. Leech, Secretary and Treasurer.
- Myers (H. M.) & Co. Limited, Beaver Falls, Beaver county. Rolling mill built in 1883; 2 heating furnaces and 3 trains of 18-inch rolls; product, sheet steel, used by the firm in the production of shovels, spades, grain scoops, etc. Fuel used, natural gas partially.
- New Castle Steel Company, New Castle, Lawrence county. Built in 1889; 2 Siemens heating furnaces and 4 trains of rolls; product, wire rods, from purchased billets, used in the manufacture of wire nails by the New Castle Wire Nail Company; annual capacity, 35,000 net tons. Wm. Patterson, President; Edward King, Treasurer; John Stevenson, Jr., Manager.
- Scottdale Iron and Steel Company Limited, Scottdale, Westmoreland county. Built in 1873; 8 single and 4 double puddling furnaces, 3 heating furnaces, 7 sheet furnaces, and 4 trains of rolls; product, muck bar and sheet iron; annual capacity, 8,000 net tons of muck bar and 7,000 net tons of sheet iron. Fuel used, natural gas. C. Grazier, President; J. R. Stauffer, Secretary; P. S. Louck, Treasurer.
- Sharon Iron Company, Sharon, Mercer county. Built in 1852; 11 double and 13 single puddling furnaces, 12 heating furnaces, 7 trains of rolls, (one 8, one 12, one 16, two 18, one 20, and one 24-inch,) and 64 nail machines; product, bar, band, hoop, tank, and sheet iron, light T rails, and iron and steel nails; annual capacity, 30,000 net tons, including 150,000 kegs of nails. Brand, "Shenango." Use producer gas in heating furnaces. C. H. Buhl, proprietor, Detroit, Michigan; Frank Buhl, General Manager, Sharon; David Adams, Secretary and Treasurer,

Sharon. Selling agents, Buhl, Sons & Co., Detroit. *See Shenango Valley Furnaces.*

Sharon Steel Casting Company, Sharon, Mercer county. Built in 1887, and first steel made August 26, 1887; one 5-gross-ton and one 15-gross-ton Siemens-Martin open-hearth furnace; product, open-hearth steel castings of all kinds; annual capacity, 10,000 net tons. Use producer gas. Adding a machine shop. F. H. Buhl, President; S. McClure, Vice-President; Daniel Eagan, Secretary and General Manager; John Forker, Treasurer.

Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 16 single puddling furnaces, one heating furnace, 2 hammers, (2½-ton and 5-ton,) and 2 trains of 3-high 18-inch rolls; product, muck bar and hammered blooms for steel purposes; annual capacity, 9,000 net tons. Coal used for fuel. Brand, "Stewart." Fayette Brown, Chairman, and Harvey H. Brown, Treasurer, 101 St. Clair st., Cleveland, Ohio; Samuel McClure, Agent and Manager, Sharon. *See Stewart Furnaces in Shenango Valley.*

Waggoner, Hartman & Co., Brownsville, Fayette county. Completed December 1, 1873; remodeled in 1889; 15 single puddling furnaces, 3 heating furnaces, and 2 trains of rolls; product, skelp iron, merchant bar iron, and muck bar; annual capacity, 10,000 net tons. Will use natural gas for fuel.

West Penn Steel Works, Jennings Brothers & Co. Limited, Safe Deposit Building, 83 Fourth ave., Pittsburgh. Works at Leechburg, Armstrong county. Built in 1881; one 10-gross-ton Siemens open-hearth steel furnace, one heating furnace, and one 8-ton hammer; rolling mill added in 1886, containing 9 heating furnaces, 2 annealing furnaces, and two 22-inch trains of rolls; product, fine sheet steel and light plate steel; annual capacity, 7,500 net tons. Fuel used, natural gas exclusively. Benjamin F. Jennings, Chairman and General Manager; John Davis, Treasurer; and T. Dale Jennings, Secretary. Intend removing open-hearth department to Allegheny City, Allegheny county.

Wheatland Iron Company, Wheatland, Mercer county. Built to roll rails in 1872; 13 double puddling furnaces, 12 heating furnaces, and 3 trains of 24-inch rolls; product, wide skelp iron, 22 inches wide and larger; annual capacity, 30,000 net tons. Fuel used, bituminous coal. B. B. Reath, President; J. W. Friend, Vice-President; H. T. Friend, Secretary and Treasurer.

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 26 completed, and one building. Of these 2 make Bessemer steel, 7 make open-hearth steel, 3 make crucible steel, and one crucible steel works is being built.

Total number of rolling mills and steel works in Pennsylvania: 202 completed, and 3 building. Of these 17 make Bessemer steel, 6

make Clapp-Griffiths steel, 3 make Robert-Bessemer steel, 31 make open-hearth steel, 20 make crucible steel and two crucible steel works are being built, 2 make blister steel, and 3 make special steel.

DELAWARE.

Delaware Iron Works, Alan Wood Company, Wooddale, New Castle county, near Wilmington. Office, 519 Arch st., Philadelphia. Built in 1812; one grate and annealing furnace and one 20-inch train of rolls; water-power; bars made for these works at Conshohocken, Pa.; product, sheet iron; annual capacity, 550 net tons. *See Rolling Mills in Eastern Pennsylvania.*

Diamond State Iron Company, Wilmington. New York office, Duncan Building, 11 Pine st. Philadelphia office, 206 South Fourth st. Two mills: Diamond State Mill, built in 1853; 3 single and 4 double puddling furnaces, one scrap furnace, 4 heating furnaces, and 3 trains of rolls (one 10 and two 18-inch). Old Ferry Mill, built in 1868; one single and 5 double puddling furnaces, 9 heating furnaces, and 6 trains of rolls (three 9, one 14, one 16, and one 18-inch). Product, 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, horse-shoe iron, horse and mule shoes, of iron and steel; total annual capacity, 40,000 net tons. Brand, "Diamond State." George W. Todd, President and Treasurer; L. A. Bower, Vice-President; Howard T. Wallace, Secretary; John T. Davis, General Superintendent.

Edge Moor Iron Company, Edge Moor, New Castle county. Philadelphia office, 1600 Hamilton st. Rolling mill first put in operation in February, 1882. William Sellers, President; John Sellers, Jr., Vice-President; George H. Sellers, General Superintendent.

Johnson Forge Company, Wilmington. Built in 1889; 4 puddling furnaces, one heating furnace, and one 3-high train of rolls; product, muck bar; annual capacity, 6,500 net tons; operated in connection with a forge. John R. Johnson, President; DeHaven Morris, Treasurer.

Marshallton Iron Works, (incorporated,) Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884; 3 double puddling furnaces, 3 grate heating furnaces, 2 reverberatory heating furnaces, 2 box annealing furnaces, and 3 trains of rolls (one 20 and two 22-inch); steam and water power; product, sheet iron; annual capacity, 2,575 net tons. Brands, "Star" and "Delaware cleaned." A factory for the manufacture of pans and elbows added in 1889.

Minquas Iron Works, McCullough Iron Company, Wilmington. Built in 1873, and first put in operation in 1875; 6 single and 2 double pud-

dling furnaces, 2 reverberatory heating furnaces, 3 grate heating furnaces, 2 annealing furnaces, 5 trains of rolls, (two 16 and three 22-inch,) and one hammer; product, "Harvey's patent cleaned" sheet iron; annual capacity, 3,000 net tons. E. A. Harvey, President; Enoch McCullough, Vice-President; J. L. McDaniel, Secretary; Henry Whiteley, Treasurer. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. *See Rolling Mills in Maryland. See Bloomaries.*

Newport Rolling Mills, Marshall Iron Company, Newport, New Castle county. Built in 1873; 2 single and one double puddling furnace, one reverberatory heating furnace, 2 grate furnaces, one annealing furnace, and three 22-inch trains of rolls; product, black sheet iron and sheet steel, numbers 16 to 28; annual capacity, 1,700 net tons. Brands, a rooster and a diamond. Edward Mendinhall, President; John M. Mendinhall, Secretary; Joseph W. H. Watson, Treasurer.

Riverside Iron Company, lessee, New Castle, New Castle county. Philadelphia office, 524 Walnut st. Mill removed from Bristol, Pa., to New Castle in 1874-5, enlarged in 1879; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and one hammer; product, boiler plate, tank, flue, and tube iron, and sheared skelp iron; annual capacity, 5,000 net tons. J. Jones Hudson, President; Walter E. Rex, Treasurer, 524 Walnut st., Philadelphia.

Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. First mill built in 1845, second in 1870, another in 1875; 5 forge fires, 5 heating furnaces, 3 trains of rolls, (17, 19, and 24-inch,) and 3 hammers; product, iron and steel boiler plates; total annual capacity, day turn, 5,000 net tons. H. B. Seidel, President; W. Hastings, Vice-President and General Manager; E. T. Canby, Secretary and Treasurer.

Number of rolling mills in Delaware: 10.

MARYLAND.

Crown and Cumberland Steel Company, 413 Commerce st., Philadelphia. Works at Cumberland, Alleghany county. Built in 1873-4; rebuilt and enlarged in 1884; 12 heating and welding furnaces, one Siemens 24-pot steel-melting furnace, 4 steam hammers, 2 cushion hammers, one helve hammer, and 2 trains of rolls (9-inch rod and 16-inch bar and sheet); product, all kinds of rolled and hammered tool, machinery, spring, tire, toe, and agricultural steel, and car axles and forgings; annual capacity, 3,000 net tons. J. Wilson Humbird, President; T. A. Hicks, Secretary and Treasurer; W. C. Dickey, General Manager; Josiah Holmes, Superintendent. Sole sales agents, Hicks & Dickey, 413 Commerce st., Philadelphia.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company,

Cumberland, Alleghany county. Main office, Mount Clare, Baltimore. First mill built in 1870 as an iron-rail mill; bar mill added in 1873; 3 single and 15 double puddling furnaces, 16 heating furnaces, 8 trains of rolls, (one 9, three 12, one 16, two 23, and one 26-inch,) and 2 hammers; product, bar iron, beams and channels, flange and refined plate, rivets and bolts, spikes, fish-plates, angles, and tees; annual capacity, 29,000 net tons. William Robinson, Superintendent. Idle.

Locust Point Iron and Steel Works, Coates & Co., Baltimore. Built in 1862; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and one hammer; product, plate, tank, and flue iron and steel; annual capacity, 7,500 net tons.

McCullough Iron Company, Northeast, Elkton, and Rowlandville, Cecil county. Three iron works in Cecil county: Northeast Works, at Northeast; West Amwell Works, at Elkton; and Octoraro Works, at Rowlandville. The Northeast Works were originally built in 1847; 4 single puddling and 6 heating furnaces, 5 trains of rolls, (two 16 and three 22-inch,) and 2 hammers; water and steam power; product, sheet iron for galvanizing, "Harvey's patent cleaned" sheet iron, and refined and best bloom bar iron; annual capacity, 3,000 net tons of sheet and 6,000 tons of bar iron. Brand, "McCullough's." The West Amwell Works were built in 1847; 3 heating furnaces, 2 trains of rolls, and smaller finishing machinery; water-power; stock obtained from Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron; annual capacity, 1,000 net tons. The Octoraro Works were originally built in 1829; 5 heating furnaces and 3 trains of rolls; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron, branded "Octoraro;" annual capacity, 2,000 net tons. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. E. A. Harvey, President; Enoch McCullough, Vice-President; Joseph L. McDaniel, Secretary; Henry Whiteley, Treasurer. *See Rolling Mills in Delaware. See Bloomaries.*

Number of rolling mills and steel works in Maryland: 6. Of these one makes crucible steel.

VIRGINIA.

Iron Gate Iron and Steel Company, Iron Gate, Alleghany county. Rolling mill building with machinery formerly in the Moundsville mill in West Virginia; expected to be put in operation in February, 1890; 11 single puddling furnaces, 2 heating furnaces, one scrap furnace, and 3 trains of rolls (8, 16, and 19-inch); product, to be bar, sheet, plate, and hoop iron, and cotton-ties; annual capacity, 8,000 net tons. A steel plant under contract to be completed in May, 1890, embracing one 15-gross-ton basic open-hearth steel furnace, one 30-pot crucible

steel-melting furnace, 10 heating furnaces, 23-inch plate and sheet train, 9 and 12-inch bar trains, cogging mill for 8-inch ingots, and 3 hammers (600-lb., 1,200-lb., and 2,000-lb.) Joseph D. Weeks, President, Pittsburgh, Pa.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle. Founded early in the present century. Owned, operated, and enlarged by present company since 1858; 15 double and 5 single puddling furnaces, 11 heating furnaces, including 2 gas heating furnaces with Siemens producers, two squeezers, 6 trains of rolls, (two 9, three 18, and one 20-inch,) and 100 nail machines; Bessemer steel works built in 1887; two 3-ton converters and blooming mill; first blow made October 10, 1887; works operated by water-power and by steam generated from waste heat of puddling furnaces; product, muck bar, steel slabs and billets, iron and steel cut nails and spikes, merchant, car, and bridge iron, steel wagon tires, etc.; annual capacity, 45,000 net tons of iron and steel. Sole manufacturer of the Walker horse and mule shoes. Brands, "Old Dominion" nails and bar iron and "Walker Forged" horse and mule shoes. Arthur B. Clarke, President; Douglas Baird, General Superintendent; John D. Baird, Engineer and Superintendent of rolling mills; George Wm. Catlett, Secretary.

Richmond Standard Spike Company, Richmond. Main office and works, Manchester, Chesterfield county. Built in 1888-9, and put in operation April 15, 1889; one double gas heating furnace, 2 forge fires, and one 9-inch train of rolls; water-power; product, dock, ship, and railroad spikes; annual capacity, 8,000 net tons. Byrd Warwick, President; J. T. Anderson, Secretary and Treasurer; R. W. Jeffery, Superintendent. Selling agent, W. N. Price, 9 Pine st., New York City.

Roanoke Rolling Mill Company, Roanoke, Roanoke county. Built in 1888-9, and put in operation May 1, 1889; 5 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 10-inch guide, one 16-inch bar, and one 18-inch muck); product, merchant bar iron and small T rails; annual capacity, 7,525 net tons. S. B. Haupt, President; George C. McCahan, Secretary; H. M. Darnall, Treasurer.

Tredegear Iron Works, Tredegear Company, Richmond. Built in 1836; one double and 14 single puddling furnaces, 10 heating furnaces, (including 4 Smith and 2 Siemens gas heating furnaces,) and 7 trains of rolls; water-power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, and horse shoes; annual capacity, 50,000 net tons. Foundry and machine shops, run by water-power, contain 3 air furnaces and 6 cupolas; have melting capacity of 150 tons per day, and make car-wheels, pipes, and machinery. Car shops connected with the works, run by both water and steam power, can turn out 200 freight cars per

month. Joseph R. Anderson, President; Archer Anderson, Treasurer; R. S. Archer, Superintendent of rolling mills; F. T. Glasgow, Superintendent of foundry and machine and car shops; J. F. T. Anderson, Secretary.

Virginia Nail and Iron Works, Virginia Nail and Iron Works Company, Lynchburg. Works at Reusens, Campbell county, $3\frac{1}{2}$ miles above Lynchburg, on the Chesapeake and Ohio Railroad. Built in 1867 and refitted in 1880; nail factory added in 1884; 6 double puddling furnaces, one Smith gas and 2 coal heating furnaces, 2 spike machines, 46 nail machines, and 3 trains of rolls (10, 18, and 20-inch); water-power; product, guide iron, round, square, and flat bar iron, nails, and spikes; annual capacity, 100,000 kegs of nails and 4,500 net tons of bar and guide iron. Brand, "Virginia." E. Schaefer, President; C. M. Blackford, Vice-President; H. L. Bowman, Secretary and Treasurer; W. C. N. Randolph, Jr., Superintendent; N. B. Handy, Commercial Agent. *See Furnaces.*

Vulcan Iron Works, Vulcan Iron Company, Richmond, Henrico county. Bolt and nut works established in 1866; rolling mill added in 1887; one Smith gas heating furnace and one 10-inch train of rolls; product, bars, bolts, nuts, washers, and iron forgings and castings. T. Seddon Bruce, President; Philip A. Bruce, Secretary and Treasurer.

Number of rolling mills and steel works in Virginia: 6 completed, and one building. Of these one has a Bessemer steel plant, and one has a basic open-hearth and a crucible steel plant contracted for.

WEST VIRGINIA.

Belmont Nail Company, Wheeling, Ohio county. Built in 1849; 25 single puddling furnaces, 3 regenerative gas heating furnaces, 4 forge fires, 2 trains of rolls, and 152 nail machines; product, nails, made from soft steel slabs, and occasionally muck bar; annual capacity, 350,000 kegs. Fuel used, natural gas, except under puddling furnaces. A. Wilson Kelly, President; J. D. DuBois, Secretary and Treasurer; N. Riester, Superintendent. *See Furnaces.*

Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. Built in 1852, burned in 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 173 nail machines; product, steel nails exclusively; annual capacity, 410,000 kegs. Fuel used, natural gas. John G. Hoffmann, President; L. S. Delaplain, Vice-President; Alonzo Loring, Secretary; George Wise, Assistant Secretary. *See Miscellaneous Bituminous Furnaces in Ohio.*

Crescent Iron Works, Whitaker Iron Company, Wheeling. Built in 1855; 15 double boiling furnaces, 3 heating furnaces, and 9 trains of rolls (pairs including bar and muck); product, sheet iron exclusive-

ly; annual capacity, 13,000 net tons. Use natural gas exclusively. George P. Whitaker, President, Principio Furnace, Md.; N. E. Whitaker, Secretary, Wheeling.

• **La Belle Iron Works, Wheeling.** Built in 1852 and enlarged since; incorporated December 3, 1875; 23 single puddling furnaces, one coal and 2 regenerative gas heating furnaces, 2 trains of rolls, (20-inch muck and 24-inch 3-high plate,) and 143 nail machines; product, steel nails and muck bar; annual capacity, 350,000 kegs of nails and 12,000 net tons of muck bar; make muck bar for market. Brand, "La Belle." Fuel used, both natural gas and coal. C. A. Robinson, President; C. E. Irwin, Secretary; John R. Robinson, Superintendent of mill; W. H. Travis, Superintendent of nail factory.

• **Riverside Iron Works, Wheeling.** Built in 1859, enlarged since; 23 single puddling furnaces, 11 heating furnaces, 224 nail machines, one hammer, and 7 trains of rolls (one 9, one 12, two 20, two 21, and one 32-inch); product, bar steel, light T rails, skelp, tack plate, and steel nails exclusively; annual capacity, 40,000 net tons of finished bar steel, tack plate, and skelp, and 550,000 kegs of nails. Bessemer steel works built in 1883-4; two 5-gross-ton converters; first blow made June 11, 1884; product, steel, used for general purposes; annual capacity, 75,000 net tons of ingots. Tube works built in 1887 for the manufacture of all kinds of steel and wrought-iron tubes from $\frac{1}{8}$ inch to 20 inches; first tube made August 11, 1887; annual capacity, 30,000 net tons. Brand, "Riverside." Fuel used, natural gas, artificial gas, and coal. J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Furnaces in West Virginia and Ohio.*

• **Top Mill, Wheeling Iron and Nail Company, Wheeling.** Built in 1867, and rebuilt in 1872; 8 single puddling furnaces, 3 Smith gas heating furnaces, 130 nail machines, double muck train and nail-plate train of rolls; product, steel cut nails and spikes; annual capacity, 300,000 kegs. Brand, "Top Mill." Fuel used, bituminous coal. Eighteen puddling furnaces removed in 1889 to make room for a new sheet mill. C. R. Hubbard, President; H. H. Hornbrook, Vice-President; C. D. Hubbard, Secretary and Treasurer. *See Furnaces.*

• **Wheeling Steel Works, Wheeling.** Works at Benwood, Marshall county. Bessemer plant built in 1885-6; first blow made August 12, 1886; two 5-gross-ton Bessemer converters, 2 soaking pits, one gas cobble furnace, and one 36-inch 2-high blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 110,000 net tons of ingots or 100,000 tons of slabs, blooms, and billets. Brand, "W. S. W." Fuel used, natural gas. A. J. Clarke, President; Andrew U. Wilson, Secretary and Treasurer; Charles T. Arnburg, Superintendent.

Number of rolling mills and steel works in West Virginia: 7. Of these 2 make Bessemer steel.

KENTUCKY.

Anchor Iron and Steel Works, L. M. Dayton, 94 West Second st., Cincinnati, Ohio. Works at Newport, Campbell county, Kentucky. Rebuilt and fitted with new machinery in 1874; 5 single puddling furnaces, 4 heating furnaces, 2 scrap furnaces, and 4 trains of rolls (one 10, one 18, and two 20-inch); product, bar, sheet, and plate iron; annual capacity, 6,000 net tons. These works are operated in connection with the American Bolt and Nut Works, owned by the same person. John Phillips, Superintendent of mill.

Ewald Iron Company, 941 North Second st., St. Louis, Mo. Two mills: Tennessee Rolling Works, at Tennessee Rolling Works P. O., Lyons county, built in 1846; 9 single puddling furnaces, 13 knobbling fires, 7 heating furnaces, 2 hammers, and 5 trains of rolls (8, 9, 16, 22, and 26-inch); product, boiler plate, sheet iron, bar and rod iron, and blooms; annual capacity, 4,000 net tons. Tennessee Rolling Mills, at Louisville, formerly called Kentucky Rolling Mill, built in 1869; 14 single puddling furnaces, 6 heating furnaces, 12 knobbling fires and bloom forge, one annealing furnace, 2 steam shingling hammers, and 5 trains of rolls (one 8-inch, one 12-inch, one 18-inch, one 100-inch plate train, and one 50-inch plate and sheet train, with chill rolls); product, bar, guide, plate, and sheet iron, tank, shell, and flange steel plates; annual capacity, single turn, 10,000 net tons. Brands of iron, "Tennessee Charcoal Bloom," "E. I. C. Charcoal," and "Laurel" stay-bolt iron. L. P. Ewald, President; William Burg, Secretary.

Licking Iron Works, Licking Rolling Mill Company, Covington. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 2 scrap furnaces, 6 knobbling fires, one hammer, and 5 trains of rolls (one 8, two 16, one 20, and one 22-inch); product, merchant bar, bridge, boiler, and sheet iron, rivets, angle, tee, jail, sash, and corrugated-roofing iron; special products, boiler plate, shafting, charcoal bar, angle, and tee iron; annual capacity, 9,000 net tons. I. Droege, President; F. J. Droege, Vice-President; J. C. Droege, Treasurer; B. Macke, Secretary.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. Built in 1873; 4 knobbling, 11 puddling, 3 scrap, 2 slab, and 2 plate-mill furnaces, 2 annealing and 5 heating furnaces, 2 steam hammers, and 6 trains of rolls; one 7-gross-ton Siemens open-hearth steel furnace built in 1879; product, plate, sheet, channel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, 15,000 net tons. Brand, "O. V." Walter J. Mitchell, President; Charles J. Tranter, Vice-President; Frank P. Mitchell, Secretary; J. R. Williamson, Treasurer; James Tranter, Superintendent.

Newport Iron and Steel Works, Newport, Campbell county. Built in 1857; 29 single puddling and 14 heating furnaces, 3 box annealing furnaces, 4 forge fires, and 9 trains of rolls (8, 10, and 18-inch bar, 2

forge, 2 sheet, and 2 plate). Product: soft flange boiler, flange sheet, and tank steel; bloom flange and C. H. No. 1 boiler, tank, and light and heavy sheet iron; bar, shafting, bridge, car, angle, tee, and other shapes; and mine T and street rails; annual capacity, 62,000 net tons. Formerly called Swift's Iron and Steel Works. The works are for sale. George Weideman and associates, owners. *See Furnaces.*

Norton Iron Works, Ashland, Boyd county. Put in operation in March, 1874; burned and rebuilt in 1883; 20 single puddling furnaces, 4 heating furnaces, 2 Smith gas furnaces, 126 nail machines, and 2 trains of rolls (one 20 and one 22-inch); product, iron and steel nails; annual capacity, 250,000 kegs. Brand, "Norton." Charles H. Greene, President; J. K. Pollock, Secretary; John Russell, Treasurer. Charles L. Colburn, Agent, No. 3 Johnston Building, Cincinnati. *See Furnaces.*

Number of rolling mills and steel works in Kentucky: 7. Of these one makes open-hearth steel.

TENNESSEE.

Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 10 single puddling furnaces, 2 gas heating furnaces, 41 nail machines, and 4 trains of rolls (8, 15, 16, and 18-inch); product, merchant bar, iron and steel nails, railroad and boat spikes, fish-plates, bolts, nuts, wrought washers, railroad, car, and miscellaneous forgings, and light T and street rails; annual capacity, 12,000 net tons, including 75,000 kegs of nails. James R. Ogden, President; O. A. Brown, Secretary and Treasurer.

Lookout Iron Company, P. O. Box G, Chattanooga. First started in October, 1876; 7 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (8, 16, and 18-inch); product, bar iron, 12 to 30-lb. T rails, rail splices, and light sections of angle and channel iron; annual capacity, 12,000 net tons. Sol. Simpson, President; J. T. Williams, Vice-President and General Manager; J. W. Thornton, Secretary, Treasurer, and Assistant Manager.

Roane Iron Company, Chattanooga, Hamilton county. Rolling mill built in 1864; 10 heating furnaces, one hammer, and 3 trains of rolls (two 18 and one 20½-inch). Open-hearth steel plant added in 1877-8; first cast made June 6, 1878; two 10-gross-ton Siemens furnaces, 12 gas producers, and 36-inch Fritz blooming mill; product, steel for merchant and rail purposes. Puddle mill, built in 1869, removed and one 5-ton Bessemer converter built in 1886-7; first blow made May 7, 1887; product, rails; annual capacity, 30,000 net tons. H. S. Chamberlain, President; D. E. Rees, Secretary. *See Furnaces.*

Southern (The) Steel Works, 641 Boyce st., Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883; one single puddling furnace, also used as a heating furnace, one 2,000-pound

hammer, and five 4-pot steel furnaces; product, best crucible cast steel, suitable for machinery and edge tools, also crow-bars, crank pins, and piston rods. John Leighton, President and General Manager; Arthur Leighton, Vice-President; Albert Leighton, Secretary; John Leighton, Jr., Treasurer.

South Tredegar Iron Company, Chattanooga. Built in 1866; 6 Siemens puddling furnaces, 3 Siemens and 2 coal heating furnaces, 74 nail machines, 7 self-feeding spike machines, and 4 trains of rolls (one nail-plate, one blooming, and 2 guide trains); product, bars, nails, railroad spikes, splice bars, and washers; annual capacity, 150,000 kegs of nails, 65,000 kegs of spikes, and 2,000 net tons of other products. Also, one 2-gross-ton Bessemer converter; first blow made April 19, 1886; product, steel for nail plate. A. P. Ellis, President; L. Boice, Secretary.

Number of rolling mills and steel works in Tennessee: 5. Of these 2 make Bessemer steel, one makes open-hearth steel, and one makes crucible steel.

GEORGIA.

Rome Rolling Mill Company, Rome, Floyd county. Built in 1889, and put in operation in July, 1889; 3 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, (10 and 16-inch,) and one hammer; product, bar, band, and hoop iron, and cotton-ties; annual capacity, single turn, 3,000 tons. Wm. F. Nevegold, President; John Baker, Vice-President; E. B. Hill, Secretary; Charles H. Cothran, Treasurer.

Number of rolling mills in Georgia: one.

ALABAMA.

Alabama Iron and Steel 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 nail machines; product, merchant bar iron and nails; annual capacity, 9,000 net tons. Formerly called Brierfield Rolling Mill. *See Furnaces.*

Alabama Rolling Mill Company, Birmingham, Jefferson county. Works at Gate City, Jefferson county. Built in 1887-8, and put in operation in February, 1888; 16 single puddling furnaces, one gas and 2 coal heating furnaces, and 3 trains of rolls (8 and 16-inch bar and 18-inch muck); product, bars, bands, hoops, light T rails, etc.; annual capacity, 12,000 net tons. W. J. Behan, President; W. H. Hassinger, Vice-President and General Manager; D. M. Forker, Secretary and Treasurer.

Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Built in

1887-8, and put in operation in September, 1888; 24 single puddling furnaces, 6 heating furnaces, 3 trains of rolls, (8-inch guide, 16-inch bar, and 20-inch muck,) and 3 Siemens producers; product, bar, guide, plate, and sheet iron; annual capacity, 30,000 net tons. Morris Adler, President; L. E. Bruns, Secretary and Treasurer; Lewis Jones, Superintendent.

Birmingham Rolling Mill Company, Birmingham, Jefferson county. Main office, Louisville, Ky. Completed in July, 1880; 10 double and 3 single puddling furnaces, 7 annealing furnaces, 2 pair furnaces, and 6 trains of rolls (two 8, one 16, one 18, and two 24-inch); new mill added in 1887, containing 22 single puddling furnaces, one heating furnace, one squeezer, and one 20-inch train of rolls; product, bar, angle, sheet, and plate iron, round-edge tire, small T rails, tram rails, and fish-plates; car-iron a specialty; annual capacity, 50,000 net tons. Use producer gas in heating furnaces, and making arrangements to use it in puddling furnaces. James G. Caldwell, President; B. du Pont, Secretary; Thomas Ward, General Manager; J. D. Dwyer, Superintendent.

Fort Payne Rolling Mill, Fort Payne Rolling Mill Company, Fort Payne, DeKalb county. Building in 1889, to contain 4 heating furnaces, one 8-inch and one 16-inch train of rolls, and 100 nail machines. Intend building two 15-gross ton open-hearth steel furnaces. W. P. Rice, President; A. W. Train, Vice-President and Manager; E. H. Towne, Secretary.

Henderson Steel and Manufacturing Company, Birmingham. Building one 20-ton basic open-hearth furnace to take the place of an experimental Henderson open-hearth furnace built in 1887-8, and first steel made February 27, 1888. Intend adding a rolling mill.

Shelby Rolling Mill Company, Helena, Shelby county. Works started in March, 1873; being enlarged by present company in 1889 to contain 10 single puddling furnaces, 3 heating furnaces, and 4 trains of rolls; product, merchant bar and band iron and light T rails; annual capacity, 8,000 net tons. Formerly called Central Iron Works. George H. Dudley, President, Florence, Ala.; E. A. Hopkins, Vice-President, Philadelphia; Richard Fell, Secretary and Treasurer, Helena.

Southern Rolling Mill, Elyton Land Company, Birmingham. Built in 1888-9, using part of machinery formerly in Nashville Iron Company's works, at Nashville, Tenn.; 15 single puddling and 3 heating furnaces and 3 trains of rolls (3-high 12-inch bar, 3-high 12-inch guide, and 2-high 18-inch muck); product, merchant bar iron; daily capacity, 60 net tons. H. M. Caldwell, President; W. J. Milner, Secretary; John London, Treasurer.

United States Rolling Stock Company, Anniston, Calhoun county. Built in 1884, and enlarged in 1888-9; one single and 5 double pud-

dling furnaces, 5 heating furnaces, 3 trains of rolls, (two 18 and one 22-inch,) and 5 hammers (one 6,000-lb., two 4,000-lb., and two helve); product, car axles; annual capacity, 12,000 net tons. (Works formerly called Anniston Rolling Mill.) A. Hegewisch, President, and Thomas F. B. Parker, Secretary, New York; C. D. Rags, Vice-President, and C. Benn, Treasurer, Chicago; W. H. Chaddock, Superintendent, at the works.

Number of rolling mills and steel works in Alabama: 7 completed, and 2 building. Of those building one is a basic open-hearth steel plant.

TEXAS.

Texas Rolling Mills, Houston, Harris county. Built in 1884, and put in operation in May, 1884; 3 heating furnaces, 2 spike machines, and 2 trains of rolls; product, light T rails, bars, spikes, fish-plates, and general railroad supplies; annual capacity, 5,000 net tons. Samuel Allen, President; T. W. House, Treasurer; G. C. Street, Secretary.

Number of rolling mills in Texas: one.

OHIO.

LAKE COUNTIES.

American Wire Company, Cleveland. Built in 1886, and first put in operation in November, 1886; new rod mill built in 1888, and first put in operation in January, 1889; 2 heating furnaces and 2 trains of rolls (one a continuous train); product, steel wire rods; annual capacity, 50,000 net tons. Thomas Jopling, President and Treasurer; S. T. Wellman, Vice-President; William Arkless, Secretary and General Manager.

Britton Iron and Steel Company, Cleveland, Cuyahoga county. Built in 1853; rebuilt in 1873; 5 single puddling and 8 knobbling furnaces, 9 heating furnaces, 4 trains of rolls, (one 18, two 21, and one 28-inch,) and one hammer; product, black and galvanized iron and steel plates and sheets; annual capacity, 6,000 net tons. Formerly called Cleveland Boiler Plate Manufacturing Company and Standard Iron Company. Fuel used, coal, producer gas, and crude oil. J. W. Britton, President; Frank Rockefeller, Vice-President; H. F. Carleton, Secretary and Treasurer.

Cleveland Hardware Company, Lake st., between Belden and Kirtland sts., Cleveland. Built in 1879; one heating furnace, with Smith and Laughlin gas producer, and one 9-inch train of rolls; product, shapes for wagon, carriage, and sleigh hardware, rolled from muck bar and scrap; annual capacity, 7,000 net tons. Lee McBride, President; R. M. Parmelee, Vice-President; Charles E. Adams, Secretary and Treasurer.

Cleveland Rolling Mill Company, Cleveland. Works chiefly located at Newburgh. Bessemer steel works built in 1867-8; first blow made October 15, 1868; two 10-gross-ton converters; annual capacity, 150,000 net tons Bessemer steel ingots. Open-hearth steel works built in 1876-8; contain five Siemens-Martin furnaces, two 15-gross-ton and three 7-ton; annual capacity, 40,000 tons of open-hearth steel ingots. Rail mills built in 1857; 5 heating furnaces, one train of rolls, and blooming mill; annual capacity, 100,000 tons of rails. Three rod mills; 5 trains of rolls; annual capacity, 125,000 tons. Wire mills were built in 1868, and have an annual output of 45,000 tons of finished wire. Plate mills consist of 6 single puddling furnaces and 4 trains of rolls (muck mill, 2 sheet mills, and plate mill); galvanizing works attached; annual capacity, 10,000 tons. The company also has a foundry, a forge, machine shops, barb-wire-fence manufactory, and blast furnaces. Product, wire, tire and spring steel, hoops, wire rods, merchant steel, galvanized and black sheet iron, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, Bessemer steel rails, blooms, structural shapes, and barb-wire fencing. Oil and gas made from oil used largely as fuel. William Chisholm, President; W. B. Chisholm, Vice-President; E. S. Page, Secretary; John Walker, Superintendent. *See Furnaces.*

H. P. Nail Company, Cleveland, Cuyahoga county. Built in 1880, and first put in operation in March, 1880; 3 heating furnaces, one 9-inch and one 18-inch train of rolls, and 190 wire-nail machines; product, steel wire nails, steel wire rods, and steel wire; annual capacity, 480,000 kegs of wire nails and 28,000 net tons of rods or wire. Fuel used, slack coal. S. H. Chisholm, President; C. B. Beach, Vice-President; E. C. Beach, Secretary.

Lake Erie Iron Works, Lake Erie Iron Company, 101 St. Clair st., Cleveland. Built in 1852; 16 single puddling and 19 heating furnaces, 4 trains of rolls, and 13 hammers; product, locomotive and car axles, iron and steel forgings of every description, iron shafting up to 20-inch round, and merchant bar iron; annual capacity, 19,000 net tons. Nut and bolt works produce daily 40 tons of nuts and bolts of every description used by railroads, car builders, and for agricultural implements. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; James E. Lewis, Superintendent of rolling mill; F. R. Scofield, Superintendent nut and bolt works.

Maumee Rolling Mill, Maumee Rolling Mill Company, Toledo, Lucas county. Works at East Toledo. Built in 1883-4, burned April 10, 1887, and rebuilt in 1887-8; 3 single and 7 double puddling furnaces, one scrap furnace, 10 heating furnaces, 7 trains of rolls, and one 5-ton hammer; product, extra quality assorted merchant bar, band, and shafting iron, also boiler plate, sheet, and tank iron and steel; special attention given to the manufacture of iron for bridge

work and agricultural implements; annual capacity, 24,000 net tons. Fuel used, natural gas. H. S. Walbridge, President; Joseph K. Secor, Vice-President; George F. Russell, General Manager; C. A. Borts, Superintendent.

Otis (The) Steel Company Limited, Cleveland. Built in 1873-4, and put in operation January 1, 1875; 2 rotary puddling furnaces, 7 Siemens heating furnaces, 6 hammers, seven 15-gross-ton Siemens open-hearth furnaces, and 4 trains of rolls (one 10, one 20, and two 31-inch); product, steel plate, bar steel, and forgings; annual capacity, 40,000 net tons. Brand, "Otis Steel." Two 5-gross-ton converters for the production of Bessemer steel have since been added; first blow made August 5, 1884; product, steel for wire rods; annual capacity, 35,000 net tons. Charles A. Otis, Thomas Jopling, and J. K. Bole, Managing Directors.

Prospect Rolling Mill Company, Cleveland, Cuyahoga county. Built in 1888, and put in operation in August, 1888; 12 single puddling furnaces, 2 heating furnaces using oil fuel, and one 9-inch train of rolls; product, rounds, squares, flats, and horse-shoe, tire, bolt, and nut iron; annual capacity, 9,000 net tons. A. A. Fuller, Secretary; L. Levy, Treasurer; W. F. Loyd, Superintendent. Selling agents, Condit, Fuller & Co., Cleveland.

Union Rolling Mill Company, 105 Superior st., Cleveland. Works at Newburgh. Built in 1866-7; 16 single puddling furnaces, 6 heating furnaces with Siemens gas producers, and 3 trains of rolls (8, 9, and 18-inch); product, bar iron, angles, fish-plates, shafting, and light T and street rails; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 120 net tons of finished iron. S. W. Sessions, President; A. S. Upson, Vice-President; A. R. Treadway, Secretary; S. A. Fuller, General Manager and Treasurer; Charles Kennedy, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Lake region: 10. Of these 2 make Bessemer steel and 2 make open-hearth steel.

MAHONING VALLEY.

Akron Iron Company, Akron, Summit county. Built in 1866; 19 single puddling furnaces, one scrap furnace, 4 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best common, refined, and charcoal bar iron, shafting, and light T rails from 10 to 30 lbs. per yard; specialties, patent calendered iron and steel shafting and iron for agricultural implements; annual capacity, 9,000 net tons. Fuel used, coal exclusively. Lewis Miller, President; J. A. Long, Secretary and Treasurer; A. P. Baldwin, General Superintendent; E. B. Miller, Assistant Superintendent.

Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863 and 1874; 34 single puddling furnaces,

8 heating furnaces, and 6 trains of rolls (one 6, one 7, two 8, one 10, and one 16-inch); product, hoops, bands, horse-shoe iron, bar iron, guide iron, and cotton-ties; annual capacity, 50,000 net tons. Brands, "C., McC. & Co." and "Eagle." Have 3 gas furnaces at work, and are using natural gas for fuel. Adding 8 additional puddling furnaces. Myron C. Wick, President; W. E. Taylor, Secretary and Treasurer.

Falcon Iron and Nail Company, Niles, Trumbull county. Two mills: Falcon Iron and Nail Works, built in 1867; 14 single puddling furnaces, 8 heating furnaces, 2 scrap furnaces, 2 box annealing furnaces, 44 nail machines, and 4 trains of rolls (two 20 and two 22-inch). Russia Sheet-Iron Mills, built in 1864; 17 single puddling furnaces, 5 heating furnaces, 2 box annealing furnaces, and 3 trains of rolls. Product, skelp iron, sheet iron, and nails; annual capacity, 100,000 kegs of cut nails, 20,000 net tons of skelp iron, and 10,000 net tons of sheet iron. Warner Arms, President; Tod Ford, Vice-President; Myron I. Arms, Secretary and Treasurer.

Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Built at Niles, Trumbull county, in 1872, and removed to Haselton, Mahoning county, in 1880-1; 11 double and 22 single puddling furnaces, 8 heating furnaces, and 5 trains of rolls (one 8, one 10, one 16, and two 22-inch); product, bar, plate, sheet, rod, skelp, and band iron and steel; annual capacity, 25,000 net tons. Brand, "Haselton." Fuel used, natural gas and coal. L. E. Cochran, President and Treasurer; James Neilson, Vice-President; H. W. Heedy, Secretary. Western office, 53 Dearborn st., Chicago; Eastern office, 15 White Building, Buffalo, N. Y. *See Furnaces.*

Hubbard (The) Iron Company, Youngstown. Works at Hubbard, Trumbull county. First put in operation in November, 1872; one double and 10 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 16-inch); product, merchant bar iron; specialty, horse-shoe bar and bolt and nut iron; annual capacity, 15,000 net tons. H. O. Bonnell, President; W. Scott Bonnell, Vice-President; Ralph J. Wick, Secretary and Treasurer.

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Built in 1846; 42 double and 40 single puddling furnaces, 19 heating furnaces, 50 nail machines, 6 spike machines, and 13 trains of rolls (two 8, two 10, one 12, one 18, two 20-inch, one sheet, and 4 muck); product, merchant bars, I beams, channels, angles, universal-mill plates, angle splices, railroad links and pins, washers, special shapes for agricultural implements, sheets, nails, and railroad and boat spikes; annual capacity, 130,000 kegs of nails and 68,000 net tons of other products. Brand, "Mahoning." Fuel used, natural gas and producer gas, the latter for heating furnaces. J. F. Taylor, Receiver's Agent, and John I. Will-

iams, General Superintendent, Youngstown; Charles H. Hawkins, Receiver's Agent, Chicago. *See Mahoning Valley Furnaces.*

Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; 3 single and 28 double puddling furnaces, 12 heating furnaces, 6 trains of finishing rolls, and 55 nail machines; product, merchant bar iron, angles, tank, plate, and sheet iron, boat spikes, bridge rivets, and steel nails; annual capacity, 50,000 tons; also make "Acme" polished shafting; daily capacity, 20 tons. Fuel used, bituminous coal. H. O. Bonnell, President; Richard Brown, Vice-President; W. Scott Bonnell, Secretary; J. L. Botsford, Treasurer. *See Mahoning Valley Furnaces.*

Niles Rolling Mill, Coleman, Shields & Co., Niles, Trumbull county. Built in 1841; 16 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, skelp iron and muck bar; annual capacity, 8,000 net tons of finished iron and 10,000 tons of muck bar. Owners, J. Morgan Coleman, Henry B. Shields, and George J. Margerum.

Stirling Works, Howe & Co., Cuyahoga Falls, Summit county. Built in 1865; rebuilt in 1884; 2 heating furnaces and one 8-inch and one 20-inch train of rolls; product, hollow staybolt iron; annual capacity, 1,000 net tons. Chain plant bought by Findlay Rolling Mill Company and removed to Findlay in 1888.

Summers Iron Works, Summers Brothers & Co., Struthers, Mahoning county. Built in 1881-2; 2 single and 2 double puddling furnaces, one pair furnace, 2 heating furnaces, 3 patent box annealing furnaces, and 2 trains of rolls; product, light sheet iron; annual capacity, 2,300 net tons. Brands, "S. B. & Co." and "Struthers." Fuel used, coal and slack. Rebuilding the machinery in the present mill, and contemplate the erection of a new sheet mill. William Summers, President; S. Summers, Secretary and Treasurer.

Trumbull Iron Company, Girard, Trumbull county. Two mills in Trumbull county. Girard Mill, at Girard, built in 1872 by Girard Rolling Mill Company; put in operation September 1, 1873; purchased by the present company in 1878; 27 single puddling furnaces, 3 Smith regenerative gas heating furnaces, and 4 trains of rolls (one 20-inch muck, and one 7, one 8, and one 10-inch finishing train); product, all sizes of bar iron and small T rails; special attention given to the manufacture of iron for chains, bolts, nuts, and agricultural implements; annual capacity, 24,000 net tons. Warren Mill, at Warren, built in 1870, burned in 1878, and rebuilt in 1879; purchased by present company in 1889; 16 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 20-inch muck, and one 10-inch and one 20-inch finishing); product, bar and skelp iron, shafting, etc.; annual capacity, 20,000 net tons. Henry Wick, President; John C. Wick, Vice-President; Charles F. Hofer, Secretary; George D. Wick, Treasurer and General Manager.

Youngstown Rolling Mill, The Youngstown Rolling Mill Company, Youngstown. Built in 1871; burned and rebuilt in 1877; 24 single puddling furnaces, 2 Smith gas heating and 4 coal heating furnaces, one tire-straightening machine, and 5 trains of rolls (7, 8, 10, 12, and 20-inch); fuel, natural gas and producer gas; product, bar, hoop, band, hame, box, tongue-cap, and tire iron and steel, and cotton-ties; annual capacity, 25,000 net tons. Paul Wick, President; Thomas H. Wells, Vice-President and Treasurer; J. M. Evans, Secretary.

Youngstown Steel Company, Youngstown, Mahoning county. Built in 1882-3, and put in operation in March, 1883; one 20-gross-ton Siemens open-hearth steel furnace, which is now idle; one 10-ton Pernot revolving furnace for dephosphorizing metal by the Krupp-Bell process; product, ingots, billets, and washed metal; annual capacity, 22,500 net tons. Fuel used, producer gas. George Tod, President; Tod Ford, Vice-President and Business Manager; John Stambaugh, Jr., Secretary and Treasurer; E. L. Ford, Superintendent.

Number of rolling mills and steel works in the Mahoning Valley: 15. Of these one makes open-hearth steel.

INTERIOR COUNTIES.

Bookwalter Casting Company, Springfield, Clark county. Two 1½-gross-ton Robert-Bessemer converters built in 1888-9; product, ingots and castings. Contemplates erecting a blooming mill.

Cambridge (The) Iron and Steel Company, Cambridge, Guernsey county. Building a rolling mill, to be completed in the spring of 1890, to contain 8 single puddling furnaces, 8 heating furnaces, and 4 trains of rolls (one 22-inch muck and three 22-inch sheet); product to be sheet iron and sheet steel; annual capacity, 6,000 net tons. Will use coal in puddling furnaces and natural gas in heating furnaces. A. Beyer, President; A. W. Brown, Vice-President; John C. Becket, Secretary; W. C. Browne, Treasurer; Ambrose Beard, Business Manager.

Canton Steel Works, Bolton Iron and Steel Company, Canton, Stark county. General office, corner Twenty-first and Liberty sts., Pittsburgh, Pa. Built in 1872; 12 heating furnaces, 3 welding furnaces, 5 hammers, one 12-inch and one 20-inch train of rolls, and two 10-gross-ton Siemens open-hearth steel furnaces; first open-hearth steel made August 17, 1875; product, tool steel, cast steel, and spring steel; annual capacity, 9,000 net tons of ingots. Brand, "Canton." John J. Young, President and General Manager; R. H. Bulley, Vice-President and Superintendent; D. C. Noble, Secretary and Treasurer.

Cherry Valley Iron Works, Leetonia, Columbiana county. Formerly called Leetonia Iron and Coal Company. Built in 1871; one double and 16 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, muck bar, merchant bar, and guide iron; annual capacity, 10,000 net

tons. J. H. King, President; R. M. Gilbert, Vice-President; C. N. Schmick, Secretary and Treasurer. Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Furnaces.*

Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus, Franklin county. Built in 1854; 3 single and 6 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, merchant bar, light T rails, wire rods, and iron for harness and saddlery work and for all kinds of chains; annual capacity, single turn, 8,000 net tons. Fuel used, producer gas and oil gas. W. B. Hayden, President; C. H. Allen, Vice-President; A. Hayden, 2d Vice-President; C. H. Hayden, Secretary and Treasurer.

Columbus Steel Company, Charles Parrott, Receiver, Columbus, Franklin county. Original works built in 1872 to roll rails; changed to steel works in 1886-7; two 15-gross-ton open-hearth furnaces; first steel made in April, 1887; product, blooms, billets, and slabs; annual capacity, 12,000 net tons. Idle.

Findlay Iron and Steel Works, Findlay Rolling Mill Company, lessee, Findlay, Hancock county. Built in 1887; 3 single puddling furnaces, 2 large busheling furnaces, one heating furnace, and 2 trains of rolls (10 and 18-inch); product, bar and horse-shoe iron; annual capacity, 6,000 net tons. Fuel used, natural gas exclusively. H. W. Briggs, Manager. Owned by the Findlay Iron and Steel Company, C. H. Emerson, Receiver. *See Findlay Rolling Mill Company.*

Findlay Rolling Mill Company, Findlay, Hancock county. Built in 1887, and first put in operation August 6, 1887; 2 heating furnaces and one 10-inch train of rolls; product, merchant bar and chain iron; annual capacity, 10,000 tons. Adding 22 puddling furnaces and 2 trains of rolls. Chain plant has a capacity of 250 tons of coil and cable chain per month. Fuel used, natural gas exclusively. Also operates Briggs Iron and Tool Company's shops. H. W. Briggs, Manager. *See Findlay Iron and Steel Works.*

Kellogg (The) Seamless Tube and Manufacturing Company, Findlay, Hancock county. Eastern office, 40 Water st., Boston. Work built in 1888; one 10-gross-ton open-hearth steel furnace erected in 1888. Building one 25-ton open-hearth furnace. Fuel used, natural gas. H. Norris, President, Boston; William Heckert, General Superintendent, Findlay; Charles Kellogg, Consulting Engineer.

Lancaster Iron Company, Lancaster, Fairfield county. Building a rolling mill to contain 2 double and 16 single puddling furnaces, 2 forge fires, 5 heating furnaces, and 4 trains of rolls (7, 10, 16, and 18-inch); part of the machinery taken from Middlesex Rolling Mill in Pennsylvania; product to be merchant bars; annual capacity, 30,000 net tons. Fuel used, natural gas. Lloyd Booth, President; J. W. Friend, Vice-President; George B. Motheral, Secretary; Ralph J. Wick, Treasurer and General Manager.

- Massillon Rolling Mill, Joseph Corns & Son, Massillon, Stark county. Built in 1873, and put in operation January 4, 1875; 8 single puddling furnaces, 2 heating furnaces, one regenerative gas heating furnace, and one 9-inch and one 18-inch train of rolls; product, best common and refined bar iron; specialties, special shapes to pattern and iron for agricultural implements; annual capacity, 9,000 net tons.
- New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Built in 1883; 20 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, sheets and plates. Fuel used, coal exclusively. Jeremiah Reeves, President; George Reeves, Secretary and Treasurer.
- Reeves Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6; first iron rolled in February, 1866; 12 single puddling furnaces, 2 regenerative gas heating furnaces, and 3 trains of rolls (8, 10, and 20-inch); product, all kinds of small merchant iron and light T rails; annual capacity, 12,000 net tons. Jeremiah Reeves, General Manager; Jabez Reeves, Superintendent. Formerly called Dover Rolling Mill.
- Russia Mill, Joshua S. Ingalls & Co., Troy, Miami county. Experimental works started in 1886; present works began operations in 1889; 2 heating furnaces, one train of rolls, and 2 hammers (6,000-lb. and 8,000-lb.); product, "Craig" polished sheet steel, similar to Russia sheet iron; annual capacity, 600 net tons. Fuel used, natural gas.
- Solid Steel Company, Alliance, Stark county. One 5-gross-ton and one 10-gross-ton open-hearth steel furnace, built in 1883 and 1886, respectively; first steel cast in August, 1883; product, steel castings; annual capacity, 6,000 net tons. T. R. Morgan, Sr., President; S. J. Williams, Treasurer; W. A. Blanchard, Secretary; C. W. Roepper, Superintendent.
- United States Wire Nail Works, Jackson, Jackson county. Built in 1887-8; 2 Smith gas-heating furnaces, 2 forge fires, and 60 nail machines; product, wire nails; annual capacity, 300,000 kegs. Draw wire from purchased rods. Contemplate building in 1890 a complete rod mill. These works have absorbed the plant of the Jackson Steel and Nail Mill Company. Daniel A. Chenoweth, President and General Manager; Oscar B. Henderson, Secretary.
- Wellston Steel and Nail Mill, F. E. Hinckley, Chicago, Ill. Works at Wellston, Jackson county. Built in 1886; 2 heating furnaces, one 22-inch train of rolls, and 130 nail machines; product, steel nails; annual capacity, 300,000 kegs. *See Furnaces.*
- Whitely Steel Company, Springfield, Clark county. Built in 1886, and first put in operation in October, 1886; 7 heating furnaces, one 9-inch, one 12-inch, and one cold-rolling train of rolls, and 2 nail machines; open-hearth steel department, added in 1888, contains one

completed 8-gross-ton open-hearth furnace and one 8-ton furnace building; product, rods, flats, squares, shapes, cold-rolled iron and steel, steel nails, etc.; annual capacity, 9,000 net tons. Brand, "Whitely." W. T. Stilwell, President; William N. Whitely, Vice-President; J. W. Maxwell, Superintendent.

Zanesville Iron Works, Ohio Iron Company, Zanesville, Muskingum county. The first mill of these works was built in 1848; present company was organized in 1857, and has operated the works since then; now comprise 19 single puddling furnaces, one scrap furnace, 3 gas and 3 coal heating furnaces, one re-heating furnace, one hammer, and 5 trains of rolls (two 8, one 10, one 16, and one 20-inch); one 10-gross-ton open-hearth steel furnace completed in November, 1886; product, assorted merchant bar iron and steel and light iron and steel T rails; specialty, agricultural irons; annual capacity, 15,000 net tons. M. Churchill, President; C. W. Greene, Secretary; John R. Cary, Assistant Secretary; C. D. Greene, Treasurer. *See Furnaces.* Number of rolling mills and steel works in the interior counties: 16 completed, and 2 building. Of these one makes Robert-Bessemer steel and 6 make open-hearth steel.

OHIO RIVER COUNTIES.

Etna Iron and Steel Company, Bridgeport, Belmont county. Built in 1873, and put in operation January 1, 1874; enlarged in 1883; 31 single puddling furnaces, two scrap furnaces, 16 heating furnaces, (two being Siemens regenerative gas heating,) 4 annealing furnaces, and 8 trains of rolls (one 8, one 9, one 16, one 18, three 20, and one 22-inch); product, iron and soft steel bars, sheets, plates, and bands, light T and street rails, small angles, tees, grooves, and miscellaneous shapes; annual capacity, 30,000 net tons. Fuel used, natural gas, producer gas, and coal. W. H. Tallman, President; John A. Topping, Secretary and Treasurer; B. M. Caldwell, Manager.

Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. Built in 1852; 21 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 126 nail machines; product, nails; annual capacity, 300,000 kegs. John G. Peebles, President; L. T. Dean, Vice-President; B. H. Burr, Secretary and Treasurer. *See Furnaces.*

Bellaire Nail Works, Bellaire, Belmont county. Built in 1867, and put in operation in February, 1868; 4 heating furnaces, 2 trains of rolls, and 125 nail machines; product, steel nails and spikes; annual capacity, 370,000 kegs. Bessemer steel works built in 1883-4; two 5-gross-ton converters, 2 heating furnaces, and a blooming mill; first blow made April 28, 1884; product, principally soft steel slabs for nail plate and billets; daily capacity, 250 to 300 net tons. Fuel used, coal. James Wilson, President; A. B. Carter, Secretary and Treasurer. *See Furnaces.*

Burgess Steel and Iron Works, Portsmouth. Built in 1871; 5 single puddling furnaces, 9 heating furnaces, one 24-pot Siemens crucible steel-melting furnace, one 8-ton and one 10-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, (one 8, one 18, and one 20-inch,) and 5 steam hammers; product, plow steel, (Siemens-Martin, puddled, German, and iron-centre crucible cast,) tool steel, steel and iron boiler plate, "U. S. Norway" refined iron, blooms, five-ply safe steel, and cold-compressed shafting; annual capacity, 7,000 net tons. George Davis, President; E. N. Hope, Secretary and Treasurer; L. D. York, Superintendent.

Cincinnati Iron and Steel Company, Cincinnati. Rolling mill at Riverside, Hamilton county. Built in 1880; greatly enlarged in 1882; 10 single puddling furnaces, 8 heating furnaces, 4 patent steel-box annealing furnaces, 2 pair furnaces, one 4-ton hammer, one muck and billet train, one plate train, (with 7-foot roughing rolls and 3-high 70-inch finishing rolls,) and 2 sheet trains; product, boiler, tank, and heavy sheet steel and iron, and light sheet iron for roofing and general purposes; annual capacity, 15,000 net tons of boiler, tank, and heavy sheet steel and iron and skelp steel, and 3,500 tons of roofing and corrugated sheet iron. W. P. Harris, President and Treasurer; John L. Pfau, Secretary and Sales Agent.

Globe Rolling Mill Company, offices at 163 and 165 West Pearl st., Cincinnati. Mill at 413 West Front st. Built in 1845; 9 single puddling furnaces, 3 scrap furnaces, 4 heating furnaces, 3 knobbling fires, 5 trains of rolls, (two 8-inch guide, one 14-inch bar, one 18-inch sheet, and one 20-inch muck bar,) and one 2-ton hammer; product, bar, angle, sheet, and plate iron; annual capacity, 7,000 net tons of bar iron and 1,500 net tons of sheet and plate iron. Brand, "Globe." C. S. Holmes, President; Jacob Walter, Vice-President; L. F. Phipps, Secretary; John Gill, Superintendent.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Branch office, 106 Third ave., Pittsburgh, Pa. Built in 1875; bought and refitted by present owners in 1886; one heating furnace, one puddling furnace, one scrap furnace, 3 sheet furnaces, 2 pair furnaces, 2 annealing furnaces, one bar mill, and two 22-inch trains of sheet rolls; product, Juniata and B. B. galvanized sheet iron, plain cold-rolled refined iron, soft sheet steel, and pickled and cold-rolled steel for all purposes; annual capacity, 4,000 net tons. Fuel used, natural gas and coal. John C. Wallace, Chairman; H. T. Duff, Secretary; William Banfield, Treasurer and Manager.

Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton, Lawrence county. Built in 1852, and enlarged several times since; 21 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, sheet and plate iron, merchant iron, and light rails; annual capacity, double turn, 13,000 net tons. C. H. Bliss, President;

J. H. Kean, Vice-President; J. H. Montgomery, Secretary and Treasurer.

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 3 gas heating furnaces, one 21-inch train of plate rolls, and 160 nail machines. Bessemer steel works added in 1886-7; two 3-gross-ton converters; first blow made March 12, 1887. Blooming mill contains 3-high rolls, with lifting tables, and one Smith regenerative gas heating furnace for ingots. Product, exclusively steel nails; annual capacity, 400,000 kegs. Brand, "Jefferson." Natural gas used for fuel exclusively. S. K. Wallace, President; J. F. Lagerfell, Vice-President; G. P. Harden, Secretary; W. H. McClinton, Manager. *See Furnaces in Ohio.*

Junction Iron Company, Mingo Junction, Jefferson county. Branch office, Wheeling, W. Va. Built in 1882, and put in operation November 1, 1882; 4 Smith heating furnaces, 2 trains of rolls, and 126 nail machines; product, steel cut nails and spikes, made from steel furnished by the Laughlin and Junction Steel Company; annual capacity, 350,000 kegs. Brand, "Junction Iron Co." Fuel, natural gas. H. M. Priest, President; George A. Dean, Superintendent. *See Furnaces in Ohio.*

Kelly (The) Nail and Iron Company, Ironton, Lawrence county. Built in 1883, and first put in operation November 1, 1883; 16 double puddling furnaces, 3 heating furnaces, and 119 nail machines; product, iron and steel cut nails and spikes; annual capacity, 250,000 kegs. William D. Kelly, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer.

Laughlin and Junction Steel Company, Wheeling, W. Va. Works at Mingo Junction, Ohio. Built in 1885-6; two 5-gross-ton Bessemer converters; made first blow February 8, 1886; 4-hole soaking pit, 4-door gas heating furnace, and blooming mill; product, slabs, billets, and blooms for general purposes; annual capacity, 75,000 net tons. Fuel used, natural gas. W. L. Glessner, President; M. J. Urquhart, Secretary.

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Built in 1873-4; first keg of nails made March 4, 1874; works destroyed by fire August 8, 1881, but immediately rebuilt; 3 gas heating furnaces, one train of 20-inch rolls, 2 hammers, and 192 nail machines; product, nails, made from steel supplied by the Laughlin and Junction Steel Company, of which this company is one-half owner; annual capacity, 500,000 kegs. Use natural gas for fuel. W. L. Glessner, President; F. M. Strong, Secretary.

Lawrence Iron Works, Lawrence Iron and Steel Company, Ironton. Built in 1853; 19 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 8, one 9, one 16, and one 18-inch); product, bar,

band, chain, spike, and hoop iron of every variety, cotton-ties, and T rails from 8 to 30 lbs.; annual capacity, 10,000 net tons. Specialties, chain iron, iron fencing, concave tires, and cotton-ties. George T. Scott, President and Manager; F. C. Tomlinson, Secretary and Treasurer.

Middleport Steel and Nail Works, King, Gilbert & Warner, Columbus. Works at Middleport, Meigs county. Commenced to make nails February 22, 1886; 4 heating furnaces, one 20-inch train of rolls, and 102 nail machines. Bessemer steel plant added in 1887; two 3-gross ton converters. Product, Bessemer steel slabs, billets, and nails; annual capacity, 50,000 net tons of steel and 300,000 kegs of nails. *See Furnaces in Ohio.*

Pomeroy Rolling Mill, Pomeroy, Meigs county. Built in 1847; 3 double and 11 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls; product, band, hoop, and refined iron; annual capacity, 12,000 net tons. Formerly called Crescent Iron Works. Owned by Pomeroy National Bank.

Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth, Scioto county, Ohio. Built in 1832; 19 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 2 hammers; iron products, boiler plate, tank plate, sheet iron, bar and hoop iron, railroad spikes, small T rails, splice bars, and bolts; annual capacity, 11,000 net tons. One 10-gross-ton Siemens open-hearth steel furnace, built in 1879; steel products, boiler plate, spring steel, etc.; annual capacity, 4,500 net tons of ingots. Idle and for sale.

Spaulding Iron Company, Brilliant, Jefferson county. Rolling mill started in September, 1883, and first nails cut January 1, 1884; 20 single puddling furnaces, 3 heating furnaces, (two being Smith improved gas heating furnaces,) 4 trains of rolls, one hammer, and 78 nail machines; product, nails; annual capacity, 240,000 kegs. Fuel used, natural gas. D. Spaulding, President; C. H. Spaulding, Vice-President and Secretary; Thomas B. Taylor, Superintendent.

Standard (The) Iron Company, Bridgeport, Belmont county. Built in 1882-3, and put in operation April 1, 1883; remodeled in 1888; 8 single puddling furnaces, 2 bar and 4 pair heating furnaces, 5 softening furnaces, 4 double annealing furnaces, one plate-mill heating furnace, and 7 trains of rolls (two 18, three 20-inch sheet, one 22-inch sheet, and one 3-high 24-inch plate); product, sheet and plate iron and steel; annual capacity, 15,000 net tons. Fuel used, natural gas in part. L. S. Delaplain, President; W. T. Graham, Secretary.

Steubenville Iron and Steel Company, Steubenville, Jefferson county. Built in 1871-2; 25 puddling furnaces, 2 heating furnaces, and one 12-inch train of bar rolls; product, muck bar and pipe iron. Formerly known as the Alikanna Rolling Mill, and recently operated by the Cartwright Iron and Steel Company.

-Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Mill built in 1873 to make tinplate; remodeled in 1880 by present owners; 8 single puddling furnaces, 2 heating furnaces, 4 pair and sheet furnaces, 4 annealing furnaces, two 22-inch trains of rolls, and two pairs of cold rolls; product, plate and sheet iron and steel; annual capacity, 4,000 net tons. Fuel used, natural gas and coal. Persifor F. Smith, President and Manager; Richard G. Wood, Vice-President; Alan W. Wood, Secretary and Treasurer.

Number of rolling mills and steel works in the Ohio river counties: 21. Of these 4 make Bessemer steel, 2 make open-hearth steel, and one makes crucible steel.

Total number of rolling mills and steel works in Ohio: 62 completed, and 2 building. Of these 6 make Bessemer steel, one makes Robert-Bessemer steel, 11 make open-hearth steel, and one makes crucible steel.

INDIANA.

Etna Iron and Steel Works, 161 La Salle st., Chicago, Illinois. Works at Crown Point, Lake county, Indiana. Built in 1886; one cementing furnace, crucible steel department with one hole, and one small open-hearth steel furnace; product, steel castings. Jean L. Pfau, President; J. Louis Pfau, Jr., Secretary and Manager; T. A. Muzzall, Superintendent.

American Wire Nail Company, Covington, Ky. Works at Anderson, Madison county, Indiana. Built in 1889; 2 heating furnaces and a rod mill; product, wire rods; annual capacity, 38,000 net tons. Fuel used, natural gas. Rods used by company in the manufacture of wire nails at Covington. L. H. Gedge, President; B. H. Gedge, Secretary; E. J. Buffington, Treasurer.

Central Iron and Steel Company, Brazil, Clay county. Built in 1882-3, and first put in operation January 12, 1883; 9 double puddling furnaces, one gas and 8 coal heating furnaces, 5 trains of rolls, (two 10, one 16, and two 20-inch,) and one 1,500-lb. and two 4-ton hammers; product, merchant bar iron, light T rails, car axles, forgings, Acheson's patent railroad spikes, and Williams' wrought iron open hexagonal turn-buckles; special attention given to car and bridge specifications; annual capacity, 12,000 net tons of rolled and forged iron and 7,500 net tons of spikes. Brand, "Central." Major Collins, President and Manager; Charles Minshall, Secretary and Treasurer. *See Furnaces in Indiana.*

Chicago Horse Shoe Company, Rookery Building, Chicago, Ill. Works at East Chicago, Lake county, Ind. Built in 1888-9; 2 heating furnaces, one 12-inch train of rolls, and one 1½-gross-ton Robert-Bessemer converter; steel works made first blow October 20, 1889; product, horse-shoe bars and horse shoes. Fuel used, petroleum. George

W. Davis, President; Zenas Burns, Treasurer; Robert L. McCook, Secretary.

East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county. Built in 1886-7; 4 Smith gas heating furnaces, 2 trains of rolls, (22-inch slab and 22-inch nail plate,) 101 nail machines, and two 3-ton Bessemer converters; first blow in steel works made November 22, 1887; product, steel nails, nail slabs, tank-plate slabs, and billets; annual capacity, 36,000 net tons of steel and 300,000 kegs of nails. Idle.

Greenfield Iron and Nail Company, Greenfield, Hancock county. Main office, Indianapolis. Built in 1889, with machinery formerly in Cobb's Iron and Nail Works, at Aurora, Ind.; 4 heating furnaces, one 20-inch train of rolls, and 50 nail machines; product, cut nails; annual capacity, 150,000 kegs. Fuel used, natural gas.

Indianapolis Rolling Mills, Indianapolis Rolling Mill Company, Indianapolis, Marion county. Built in 1857; 4 double and 2 single puddling furnaces, 8 heating furnaces, and 3 trains of rolls; product, light and heavy rails; annual capacity, 30,000 net tons. Finishing part of steel-rail mill built in 1881-2; capacity, 300 net tons of steel rails in twenty-four hours. Open-hearth steel works built in 1886-7; two 15-gross-ton Siemens furnaces; first steel made in May, 1887; product, steel for rails and other manufactures. Idle since 1887. Aquilla Jones, President; John Thomas, Treasurer; W. H. Thomas, Assistant Treasurer; S. W. Morgan, Secretary and Superintendent.

Iron Dale Steel and Iron Company, Anderson, Madison county. Building a rolling mill, using part of machinery removed from Aurora; 6 puddling furnaces, 3 heating furnaces, 4 knobbling fires, 3 box annealing furnaces, 2 sheet furnaces, 2 pair furnaces, rotary squeezer, 3 trains of rolls, and one hammer; product to be bar and sheet iron; annual capacity, 10,500 net tons. Fuel, natural gas. G. R. Root and D. W. Lovett, proprietors.

Muncie Nail Company, Muncie, Delaware county. Built in 1888-9, partly with machinery formerly in the Greencastle Iron and Nail Company's works, at Greencastle, Ind.; put in operation in March, 1889; 8 double puddling furnaces, 4 heating furnaces, one annealing furnace, two 18-inch trains of rolls, and 50 nail machines; product, muck bar and iron and steel cut nails; annual capacity, 100,000 kegs of nails and 7,500 net tons of muck bar. Fuel used, natural gas exclusively. J. F. Darnall, President; W. H. Durham, Vice-President; R. B. F. Pierce, Secretary.

National Forge and Iron Company, East Chicago, Lake county. Chicago office, 557 South State st. Built in 1889, and put in operation September 15, 1889; 4 double puddling furnaces, 6 heating furnaces, 10 forge fires, 3 hammers, (1,500-lb., 3-ton, and 5-ton,) and 3 trains of rolls (one 10 and two 18-inch); product, bar iron, car axles, shafting, and general forge and blacksmith work; annual capacity, 25,000 net tons.

Fuel used, coal and petroleum. Marks Swarts, President; Frank B. Felt, Vice-President and General Manager; Seymour Swarts, Secretary and Treasurer.

New Albany Forge and Rolling Mill, New Albany, Floyd county. Forge built in 1869; rolling mill added in October, 1887; one double puddling furnace, 7 coal and 3 Swindell gas heating furnaces, 3 forge fires, 3 trains of rolls, (one 10, one 18, and one 21-inch,) and 6 hammers; product, car axles, shafting, and bars; annual capacity, 5,000 net tons of axles, 400 tons of shafting, and 10,000 tons of bars. Charles Sackett, President; George E. Sackett, Secretary and Treasurer; Joseph Norton, Superintendent of rolling mill; W. J. Scott, Superintendent of forge.

New Albany Rail Mill Company, New Albany, Floyd county. Built in 1864; 5 double and 6 single puddling furnaces, 5 forge fires, 11 heating furnaces, 3 spike machines, 4 trains of rolls, and 2 Archer oil-gas producers; product, T rails, (8 to 65 lbs.) tram rails, street rails, bars, angles, fish-plates, spikes, washers, iron and steel channels for cars, etc.; steel slot beams for cable roads a specialty; annual capacity, 35,000 net tons. C. W. DePauw, President; N. T. DePauw, Vice-President; Albert Trinler, General Manager.

Ohio Falls Iron Works, New Albany, Floyd county. Built in 1866; 15 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (8-inch guide, 16-inch bar, and 18-inch muck); product, bridge, bar, plow, and stay-bolt iron; annual capacity, 10,000 net tons. Newland T. DePauw, President; Peter R. Stoy, Vice-President and Treasurer; Walter E. Stoy, Secretary.

Schulte, Lohoff & Co., Evansville, Vanderburgh county. Built in 1887-8; three 10-pot steel-melting holes, 5 forge fires, and 6 hammers; product, crucible steel, used by the firm in the manufacture of edge tools. Frank Lohoff, Manager.

Terre Haute Iron and Nail Works, Terre Haute, Vigo county. Built in 1868; destroyed by fire September 19, 1873, but rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double and 16 single puddling furnaces, 2 scrap and 2 regenerative gas heating furnaces, 144 nail machines, and 3 trains of rolls; product, iron and steel nails and bar iron; annual capacity, 200,000 kegs of nails and 10,000 net tons of bar iron. Brands, "Terre Haute," "Superior," and "Selected." J. P. Crawford, President; A. J. Crawford, Vice-President and Treasurer; Samuel Bridwell, Secretary.

Wabash Iron Company, Terre Haute, Vigo county. Completed in January, 1874; 15 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 18, and one 20-inch); product, all kinds of bar and guide iron and light T rails; annual capacity, 12,000 net tons. Brand, "Wabash." A. J. Crawford, President; J. P. Crawford, Secretary, Treasurer, and Manager.

Number of rolling mills and steel works in Indiana: 15 completed, and one building. Of these one makes Bessemer steel, one makes Robert-Bessemer steel, 2 make open-hearth steel, 2 make crucible steel, and one makes blister steel.

ILLINOIS.

Belleville Steel and Iron Nail Works, Belleville Crescent Nail Company, lessee, Belleville, St. Clair county. Built in 1885-6; 2 heating furnaces, one 22-inch train of rolls, and 60 nail machines; product, iron and steel nails. Benhard Yoch, President; Peter Chuse, Secretary; Henry Reis, Treasurer.

Calumet Works, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at Cummings, Cook county. First put in operation in August, 1876; 24 double puddling furnaces, 2 scrap and 5 heating furnaces, 4 trains of rolls, (9, 14, 20, and 22-inch,) and 132 nail machines; use gas made by Siemens producers; product, merchant bar iron and iron and steel nails; annual capacity, 20,000 net tons of bar iron and 300,000 kegs of nails. Four 4-gross-ton open-hearth steel furnaces added in 1882; made first steel in October, 1882; product, steel for nails, merchant bar, and steel castings; annual capacity, 20,000 net tons. Brand, "Calumet." Charles Himrod, President; H. A. Howard, General Manager.

Centralia Iron and Nail Works, Centralia, Marion county. Built in 1878, and put in operation in March, 1879; 2 heating furnaces, one annealing furnace, 52 nail machines, and one 19-inch train of rolls; product, steel nails; annual capacity, 140,000 kegs. Bessemer plant built in 1887-8; first blow made March 29, 1888; one 2-gross-ton converter, 2 Smith gas heating furnaces, and one small blooming train; product, nail slabs and billets; daily capacity, 75 net tons. The works are idle and for rent. S. M. Warner, President; E. S. Condit, Vice-President; W. E. C. Lyons, Acting Secretary; F. Kohl, Treasurer; M. H. Monkhouse, Superintendent.

Chicago Crucible Steel Casting Company, Elston and Webster avenues, Chicago. Office, 156 Lake st. Built in 1886, and removed to new works in 1888; one 30-pot steel-melting furnace and one 5-gross-ton open-hearth steel furnace; product, steel castings and ingots; annual capacity, 2,500 net tons. Charles P. Singer, President; William Chambers, Secretary.

Chicago Splice Bar Mill, Morris Sellers & Co., 6 Ashland Block, Chicago. Built in 1878; one forge fire, 3 heating furnaces, and 2 trains of rolls; product, "Samson" splice bars; annual capacity, 12,000 net tons. Howard Greer, Superintendent.

Chicago Steel Works, 806 Noble st., Chicago. Built in 1873; 9 heating furnaces, 3 forge fires, and 2 trains of 3-high 14-inch rolls; manipulate Bessemer steel rail ends; product, tires, plow beams, harrow

- teeth, springs, steel cultivator sleeves, shovel backs, and squares, diamonds, ovals, tees, and shapes for agricultural implements; annual capacity, 15,000 net tons. Use petroleum for heating furnaces and under boilers. E. Buckingham, Vice-President; J. H. Buckingham, Secretary and General Manager; E. H. Buckingham, Treasurer.
- Chicago Tire and Spring Company, Phenix Building, Chicago. Works at Melrose, Cook county. Tire mill built in 1881-2; new mill built in 1888; 3 heating furnaces and 2 trains of tire rolls; product, steel locomotive tires. Spring works have furnaces, rolls, and machinery for railroad springs. C. H. Ferry, President.
- Fowler Rolling Mill, Fowler Rolling Mill Company, 185 Dearborn st., Chicago. Built in 1882; one forge fire, 2 heating furnaces, and one 9-inch train of rolls; product, "Fowler" railroad spikes; annual capacity, 80,000 kegs. Fuel used, crude petroleum exclusively. Sidney A. Kent, President; William J. Watson, Vice-President; H. W. Fowler, Secretary, Treasurer, and General Manager.
- Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Works, Stony Island avenue and Ninety-fifth st. Built in 1887; double gas heating furnace, with machinery for rolling solid steel car-wheel blanks into finished integral steel car wheels; annual capacity, 75,000 car wheels. Fuel used, producer gas. Robert-Bessemer plant added in 1889; one 2-gross-ton converter; first blow made September 5, 1889; product, steel for car-wheel blanks. Building an additional 2-ton converter. H. W. Fowler, President and Treasurer; Joseph Grove, Secretary; C. H. McCormick, Vice-President.
- Haxtun Steam Heater Company, Kewanee, Henry county. Built in 1883, and put in operation in November, 1883; 4 double puddling furnaces, 3 heating furnaces, two 16-inch trains of rolls, and one 5,000-pound hammer; product, skelp iron, used by the company in the manufacture of steam-heater pipe; annual capacity, 15,000 net tons. The company manufactures everything used in the construction of steam heating apparatus for all kinds of buildings. W. E. Haxtun, President; J. H. Pierce, Secretary; E. E. Baker, Treasurer.
- Illinois Steel Company, Rookery Building, Chicago, and 151 Insurance Block, Milwaukee, Wis. Four plants in Illinois, styled the North Works, South Works, Joliet Works, and Union Works. North Works, W. L. Potter, Superintendent, located at Chicago, on the north branch of the Chicago river, at the foot of Waubansia avenue, built in 1857; one sextuple and 8 quadruple puddling furnaces, equal to 38 single furnaces, 23 heating furnaces, 10 trains of rolls, and one hammer; Bessemer steel works have two 6-gross-ton converters and all appliances for manufacturing rails; made first blow April 10, 1872; first steel rail rolled May 24, 1865, from steel made at Wyandotte, Michigan; product, Bessemer steel ingots, iron and Bessemer steel rails, and steel beams; annual capacity, 156,000 net tons ingots,

125,000 tons steel rails, 60,000 tons iron rails, and 50,000 tons steel beams, which last would come out of rail capacity. South Works, D. S. Mathias, Superintendent, located at South Chicago, made first blow June 14, 1882; contain three 10-gross-ton Bessemer converters, 5 Siemens heating furnaces, one 3-high 40-inch blooming train, and one 2-high reversing finishing train of rolls; product, Bessemer steel ingots and rails; annual capacity, 330,000 net tons ingots and 300,000 tons rails. These works are to be extended by the addition of four more blast furnaces, each 85 x 21, an open-hearth steel plant of four 15-gross-ton furnaces, and a plate mill. Work on the blast furnaces has been started. Joliet Works, H. S. Smith, Manager, located at Joliet, Will county, built in 1870; contain two 8-gross-ton Bessemer converters; made first blow January 26, 1873, and first steel rail March 15, 1873; annual capacity, 235,000 net tons of Bessemer steel ingots. Steel rail mill has 6 heating furnaces, one 36-inch blooming train, one 23-inch rail train, and a Sellers 3-ton hammer; annual capacity, 210,000 net tons of rails. The wire-rod mill, built in 1888, contains one Garrett mill with an annual capacity of 40,000 net tons. Union Works, W. R. Walker, Superintendent, located at 3179 Ashland avenue, Chicago; original mill built in 1863, and original Bessemer steel works made first blow July 26, 1871; Bessemer steel works and rail mill rebuilt in 1885-6; two 10-gross-ton converters, 5 cupolas, 4 spiegel cupolas, 3-high 35-inch blooming mill, 3 gas ingot-heating furnaces, one gas bloom-heating furnace, and one 3-high 25-inch rail train; product, Bessemer steel rails; annual capacity, 350,000 net tons ingots and 300,000 tons rails. Use oil for fuel at South Works and at Union Works. (Also 7 heating furnaces, one 22-inch plate, one 20-inch billet, one 18-inch bar, and one wire-rod mill, not now in use.) O. W. Potter, Chairman, Chicago; A. J. Forbes-Leith, President, 46 Wall st., New York; other officers at Chicago are as follows: W. R. Stirling, 1st Vice-President; E. C. Potter, 2d Vice-President; Jay C. Morse, member of Executive Committee; J. C. Stirling, Assistant to 1st Vice-President; J. J. Wait, Assistant to 2d Vice-President; Richard C. Hannah, Secretary and Treasurer; Robert Forsyth, Engineer; H. A. Gray, Comptroller; J. L. Yale, General Sales Agent; J. H. Long, Manager freight department. *See Furnaces in Illinois. See Furnaces and Rolling Mill in Wisconsin.*

Norton Fluid Metal Rolling Company, 45 River st., Chicago. Building experimental works at Maywood, Cook county, for testing the Norton fluid metal rolling process for making steel sheets.

Peoria Rolling Mill Company, Peoria. Building a rolling mill with machinery from the abandoned Norway works, South Boston, Mass.

Plano Rolling Mill Company, Plano, Kendall county. First put in operation January 1, 1885; 2 heating furnaces and one 12-inch train of rolls; product, steel of various kinds and shapes for agricultural

implements; annual capacity, 6,000 net tons. Albert H. Sears, President and Manager.

Pullman Iron and Steel Company, Pullman, Cook county. Built in 1883-4; 2 forge fires, 3 Swindell gas heating furnaces, 2 coal heating furnaces, and 3 trains of rolls (8, 10, and 18-inch); product, car and merchant iron and special shapes of iron and steel; annual capacity, 23,000 net tons of bar iron and 18,000 tons of muck bar. Chicago office in Pullman Building. A. S. Weinsheimer, Treasurer; Samuel Job, Superintendent; F. H. Taylor, General Agent.

Rock Island Arsenal, Rock Island, Rock Island county. One heating furnace, one 5,000-pound hammer, and one 14-inch train of rolls; product, bar iron, light T-rails, shafting, and heavy forgings. Built to dispose of accumulated wrought-scrap iron and to furnish material needed in the construction of the arsenal.

Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. Chicago office, 515 Phenix Building; St. Louis office, Laclede Building. Bessemer steel works built in 1886-7; two 5-gross-ton converters; first blow made September 8, 1887; annual capacity, 150,000 net tons of ingots. Open-hearth steel works contain two 20-gross-ton Siemens-Pernot furnaces and one Pernot furnace for dephosphorizing pig metal; made the first steel ingot February 9, 1880; annual capacity, 20,000 net tons. Puddle mill first put in operation in June, 1872; 8 double puddling furnaces and one 18-inch train of rolls. Blooming mill contains one 3-high 30-inch blooming train of rolls, with hydraulic tables, put in operation in 1879, and one 2-high 32-inch reversing train, put in operation in 1887, to work in direct connection with the rail mill. Rail mill put in operation in 1872, remodeled in 1887; one 23-inch train of finishing rail rolls, working in direct connection with the 32-inch blooming mill train; annual capacity, 150,000 net tons of rails. Bar mills contain 5 trains of rolls, (two 12, one 16, one 18, and one 23-inch,) adapted to work either iron or steel; product, bars, fish-plates, light rails, and merchant shapes; annual capacity, 60,000 net tons. Plate mills contain one 24-inch and one 31-inch train of rolls, the latter with rolls 112 inches in length; product, steel plates and sheets of all sizes; annual capacity, 20,000 tons. Charles Ridgely, President; William Barret Ridgely, Vice-President; Franklin Ridgely, Secretary; John Griffiths, Superintendent.

Straight Fiber Iron Company, Rookery Building, Chicago. Works at Fortieth st. and Stewart ave. Built in 1888, and burned in December, 1888; rebuilt in 1889; 6 heating furnaces and one 10-inch and one 18-inch train of rolls; product, finished material used in part by the Chicago Forge and Bolt Company for railroad and bridge work; annual capacity, 25,000 net tons. J. McGregor Adams, President; Walter L. Lee, Vice-President and Manager; Frank Newell, Secretary.

Tudor Iron Works, Third and St. Charles sts., St. Louis, Mo. Works at

East St. Louis, St. Clair county, Ill. Put in operation in January, 1873; one single and one double puddling furnace, 2 scrap furnaces, 10 heating furnaces, Siemens gas producers, 5 trains of rolls, 15 spike machines, 3 bolt headers, 5 bolt cutters, 3 nut tappers, and 5 nut machines; reroll Bessemer steel; product, railroad splices, T rails, bolts, and spikes; annual capacity, 35,000 net tons. Brand of spikes, "Tudor." T. A. Meysenburg, President; B. S. Adams, Secretary; F. W. Oliver, Treasurer.

Waugh Steel Works, Belleville, St. Clair county. Built in 1869-70; remodeled in 1886-7; 5 heating furnaces, 2 trains of rolls, and 76 nail machines. Bessemer steel works built in 1886-7; two 4-gross-ton converters; first blow made August 6, 1887. Product, cut nails, 12 to 40-lb. rails, billets, slabs, shafting, bars, flats, fish-plates, etc.; annual capacity, nails, 150,000 kegs; other products, 50,000 net tons. Brand, "Waugh Steel Works." William W. Waugh, President; J. C. Waugh, Vice-President; Robert F. Waugh, Secretary and Treasurer; J. J. Carey, Manager. Selling agents, O. W. Meysenburg & Co., St. Louis.

Western Nail Company, Belleville, St. Clair county. Rolling mill and nail works first put in operation in September, 1882; steel works made first blow January 21, 1886; two 3-gross-ton Clapp-Griffiths steel converters, 2 ordinary heating furnaces, one Smith gas heating furnace, one 23½-inch slab train, one 3-high 21-inch nail-plate train, and 154 nail machines; product, steel nails; annual capacity, 25,000 net tons steel ingots and 350,000 kegs of nails. W. H. Powell, President and General Manager. This company is to be reorganized and the works put in full operation early in 1890.

Number of rolling mills and steel works in Illinois: 22 completed, and two building. Of these 7 make Bessemer steel, one makes Clapp-Griffiths steel, one makes Robert-Bessemer steel, 3 make open-hearth steel, and one makes crucible steel.

MICHIGAN.

Baugh Steam Forge Company, Detroit, Wayne county. Office, No. 1 Newberry Building. Forge built in 1870, rolling mill in 1877; 12 heating furnaces, 6 hammers, and 3 trains of rolls (9, 16, and 20-inch); product, car axles, links and pins, shafting, and bar iron. James McMillan, President; Hugh McMillan, Vice-President; John B. Baugh, General Manager; Samuel A. Baugh, Superintendent; W. K. Anderson, Treasurer; R. D. Field, Secretary.

Detroit Steel and Spring Works, Michigan and Hubbard avenues, Detroit. First put in operation in May, 1882; 7 Swindell and 4 double Weber heating furnaces, 2 trains of rolls, (one 9 and one 18-inch,) and 8 hammers; product, shapes, rolled from purchased steel; annual capacity, 8,000 net tons. Crucible steel department made first steel in

February, 1884; one Siemens gas pot furnace and six steel-melting holes; can use 30 pots at each heat; product, tool and spring steel; annual capacity, 2,500 tons. Use Archer oil gas fuel in part of works. Alexander De Lano, President; Charles P. Choate, Vice-President.

Eureka Iron and Steel Works, 21 Newberry Building, Detroit, Wayne county. Works and main office, Wyandotte, Wayne county. Built in 1855; 5 double and 5 single puddling furnaces, 12 forge fires, 11 heating furnaces, 6 trains of rolls, (8, 10, 18, 20, 24, and 30-inch,) and one 5-ton hammer; product, "Wyandotte" boiler plate and tank iron and bars; annual capacity, 9,000 net tons plates and 24,000 tons bars. Formerly called Wyandotte Rolling Mills. W. K. Muir, President, S. D. Miller, Vice-President and Secretary, and George Hendrie, Treasurer, Detroit; J. S. Van Alstyne, Agent, and Thomas D. Evans, Superintendent, Wyandotte. *See Furnaces.*

Michigan Steel Works, Detroit, Wayne county. Built in 1889, and put in operation in July, 1889; two 2-gross-ton Robert-Bessemer steel converters; made first blow July 11, 1889; product, ingots and castings. Fuel, petroleum. Alexander De Lano, President; Charles P. Choate, Vice-President; Allen W. Atterbury, Secretary.

Number of rolling mills and steel works in Michigan: 4. Of these one makes Robert-Bessemer steel and one makes crucible steel.

WISCONSIN.

Illinois Steel Company, Rookery Building, Chicago, Ill., and 151 Insurance Block, Milwaukee, Wis. Milwaukee Works, Francis Hinton, Manager, and E. L. Bennet, Cashier, located at Bay View, Milwaukee, built in 1868 and 1874, and nail mill added in 1884; 8 quadruple puddling furnaces, 19 coal and 5 Siemens heating furnaces, 7 trains of rolls, (one 8, one 9, one 12, two 18, one 21, and one 22-inch,) 100 nail machines, and one hammer; product, rails, nails, merchant bar iron, fish-plates, car links and pins, and horse shoes; annual capacity, 50,000 net tons of bar iron and rails, 25,000 tons of fish-plates, etc., and 300,000 kegs of nails. *See Furnaces in Wisconsin. See Furnaces and Rolling Mills in Illinois.*

Number of rolling mills in Wisconsin: one.

MINNESOTA.

Minnesota Iron Car Company, Duluth, St. Louis county. Built in 1888-9, and put in operation in October, 1889; 4 heating furnaces, 5 Smith gas producers, one 2,500-lb. and one 6,000-lb. hammer, and one 10 and one 18-inch train of rolls; product, bar iron, railroad fastenings, and axles and other forgings; annual capacity, 12,000 tons of rolled iron and 5,000 tons of forgings. Preparing to enlarge works. J. F. T. Anderson, President; Wm. E. Tanner, Vice-President and

Secretary; R. L. Ettenger, General Manager; George W. Ettenger, Treasurer, 120 Broadway, New York.

St. Paul Rolling Mill, St. Paul, Ramsey county. Built in 1885-6; 2 heating furnaces, one double busheling furnace, and one 9-inch and one 16-inch train of rolls; annual capacity, 3,000 net tons. Idle since 1886. Formerly known as Capital Iron Works.

Number of rolling mills in Minnesota: 2.

MISSOURI.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Works at Second and Destrehan sts. Built in 1879; one single puddling furnace, 2 Siemens heating furnaces, 8 charcoal knobbling fires, 3 trains of rolls, and 3 hammers; product, stamping sheet iron for "granite iron ware" and galvanizing sheet; annual capacity, 6,000 net tons. F. G. Niedringhaus, President; William F. Niedringhaus, Vice-President and Manager.

Helmbacher Forge and Rolling Mills Company, corner Barton and DeKalb sts., St. Louis. Works, South Second st., between Lami and Barton sts. Built in 1858; 7 single puddling furnaces, 10 heating furnaces, 2 trains of rolls, (one 10 and one 19-inch,) and 11 hammers (ranging from 8-ton double-acting to 60-pound helve); product, bar, rod, band, and angle iron, car axles, coupling links and pins, light T rails from 8 to 20 lbs., and all kinds of iron and steel forgings for railroad and steamboat use and for machine shops; specialties, shafts, railroad car axles, links, and pins; annual capacity, 6,000 net tons of car axles and forgings and 6,000 net tons of bar iron, links, and pins. James Green, President; M. Helmbacher, Vice-President and Treasurer; G. L. Goetz, Secretary. Agents, John S. Brewer, 147 Van Buren st., Chicago, Ill.; H. C. McNair, Drake's Block, St. Paul, Minn.

Kansas City Bolt and Nut Company, Sheffield, Jackson county. Telegraph address, Kansas City. Built in 1887-8, and first put in operation in June, 1889; one heating furnace and one 10-inch train of rolls; product, bar and bolt iron; also bolts, nuts, spikes, etc; annual capacity, 4,000 net tons of bar iron and 3,000 tons of bolts, nuts, etc. Fuel used, Swindell and Smith producer gas for rolling mill and aerated oil for bolt works. Branch of the Reading Bolt and Nut Works, of Reading, Pa. J. H. Sternbergh, President; J. C. Howes, Vice-President and Treasurer; Robert Howes, Secretary.

Laclede Rolling Mills, Chouteau, Harrison, and Vallé Iron Company, 204 North Third st., St. Louis. Built in 1850; rebuilt in 1879; 20 single puddling furnaces, 4 Siemens and 5 coal heating furnaces, one scrap furnace, 4 knobbling fires, 4 trains of rolls, 2 hammers, 2 bolt headers, 2 spike machines, 4 screw cutters, 2 machines for making wash-

ers, and 2 nut tappers; product, bar, sheet, and plate iron, plate and sheet steel, blooms, angle and tee iron, 8 to 25-lb. T rails, 20 to 50-lb. flat rails, spikes, nuts, bolts, and washers; also cold-rolled sheet iron; annual capacity, 20,000 net tons. C. C. Maffitt, President; Edwin Harrison, Vice-President; Paul A. Fusz, Secretary.

St. Louis Ore and Steel Company, Granite Building, St. Louis. Works at South St. Louis. Built in 1872 as an iron-rail mill; Bessemer steel works erected in 1875-6; made their first blow September 1, 1876; two 7-gross-ton converters, 4 pig-iron cupolas, 4 spiegel-melting furnaces, 40 gas producers, 10 Siemens heating furnaces, one 3-ton hammer, one 33-inch blooming train, one 24-inch rail train, and one 24-inch billet train; product, steel slabs, blooms, rails, and billets; annual capacity, 100,000 net tons ingots. Formerly called Vulcan Works. E. A. Hitchcock, President; O. L. Garrison, Secretary and Treasurer. *See Furnaces.*

St. Louis Steam Forge and Rolling Mills, G. C. McDonald, corner Main and Miller sts., St. Louis. Built in 1862; 3 double puddling furnaces, 6 forge fires, 8 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 6 hammers; product, bar iron, car axles, and forgings; annual capacity, 10,000 net tons of axles and 2,500 net tons of bar iron.

Union Steel and Iron Company, St. Joseph, Buchanan county. Built in 1889; 2 heating furnaces, Smith gas producers, 4 trains of rolls, (one 8, one 12, one 3-high 18, and one 3-high 20-inch,) and 50 nail machines; product, merchant iron and steel, sheet iron and steel, and steel nails; annual capacity, 200,000 kegs of nails and 10,000 net tons of rolled iron and steel. Building two 2-gross-ton Robert-Bessemer steel converters. Wm. Haven, President; George T. Walker, Vice-President and Manager; and W. N. McCandlish, Secretary and Treasurer.

Number of rolling mills and steel works in Missouri: 7. Of these one makes Bessemer steel, and one is building a Robert-Bessemer steel plant.

IOWA.

Iowa Rolling Mill Company, Burlington, Des Moines county. Put in operation in 1885; enlarged in 1887; 2 puddling furnaces, one Smith and 2 Swindell gas heating furnaces, crocodile squeezer, and 2 trains of 3-high rolls (9 and 16-inch); product, all kinds of merchant bar iron, rounds, half rounds, squares, flats, and bands, car irons, and agricultural irons of all kinds; specialty, small shapes; annual capacity, 10,000 net tons. The company is enlarging the works. Theodore Guelich, President; J. W. Price, Vice-President; John F. Holcomb, Secretary; John T. Remey, Treasurer.

Number of rolling mills in Iowa: one.

KANSAS.

Western Iron Company, Rosedale, Wyandotte county. Built in 1875; 11 heating furnaces, 2 hammers, one nut and 6 spike machines, 3 trains of rolls, (9, 18, and 20-inch,) and a set of universal rolls attached to the 20-inch train; product, mine and street rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc.; annual capacity, 15,000 net tons. James H. Anderson, President, Keokuk, Iowa; A. St. J. Newberry, Secretary and Treasurer, Cleveland, Ohio; D. E. Jones, Superintendent, Rosedale. Idle.

Number of rolling mills in Kansas: one.

COLORADO.

Colorado Coal and Iron Company, Pueblo, Pueblo county. Works at Bessemer, near Pueblo. New York office, Mills Building. Built in 1881-2; extensive improvements made in 1889; converting department made its first blow April 11, 1882; two 5-gross-ton Bessemer converters, 4 Siemens heating furnaces, one 3-high 35-inch blooming train, one 3-high 23-inch rail train, 3 Siemens double-double puddling furnaces, one 20-inch muck train, one 19-inch bar train, one 9-inch guide train, and one 2-high 22-inch nail-plate train, heating and annealing furnaces, 27 nail machines, and railroad spike and bolt and nut machines; product, steel rails, bar iron, mine rails, splice bars, steel cut nails, railroad spikes, bolts, nuts, and cast-iron pipe; annual capacity, 60,000 net tons of steel rails, 12,000 net tons of bar iron, mine rails, and splice bars, 100,000 kegs of nails, and 30,000 kegs of railroad spikes, bolts, and nuts. (Rolling mill at Denver, built in 1878, has been abandoned.) Edward J. Berwind, President, Henry S. Grove, Vice-President, and Thomas E. H. Curtis, Secretary and Treasurer, Mills Building, New York; E. M. Steck, Acting General Manager, and J. B. Nau, Superintendent of steel works, Pueblo; George W. Cook, General Sales Agent, Denver. *See Furnaces.*

Trinidad (The) Rolling Mills and Iron Company, Trinidad, Las Animas county. Built in 1888-9, and started in April, 1889; 2 scrap heating furnaces and 2 trains of rolls (12 and 18-inch); product, rounds, half-rounds, squares, flats, and other forms of bars, and mine T rails; annual capacity, 7,500 net tons. The company is at present being reorganized.

Number of rolling mills and steel works in Colorado: 2. Of these one makes Bessemer steel.

PROJECTED.

Kibler Stove Company, Denver, Arapahoe county. Contemplates erecting one 1½-gross-ton Robert-Bessemer steel converter, for the production of steel for stove castings.

WYOMING TERRITORY.

Laramie Rolling Mills, F. E. Scrymser, lessee and manager, Laramie City, Albany county. Built in 1874-5; put in operation in April, 1875; 10 heating furnaces and 2 trains of rolls, (one 10 and one 19-inch,) and one 4,500-pound hammer; product, bar iron, mine rails, nuts, bolts, and spikes, and all kinds of track fastenings; annual capacity, 20,000 net tons.

Number of rolling mills in Wyoming Territory: one.

CALIFORNIA.

Central Pacific Railroad Rolling Mill, Southern Pacific Company, Sacramento, Sacramento county. Built in 1881; 9 heating furnaces, 3 trains of rolls, and 7 hammers; product, all kinds of bar and shaped iron; annual capacity, 12,000 net tons. Brand, "C. P. R. R." H. J. Small, General Manager of the mill.

Judson Manufacturing Company, Oakland, Alameda county. Built in 1882; 4 coal heating furnaces, one 4-door 7 x 18 Smith gas heating furnace, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, bar iron and tack plate; annual capacity, 12,000 net tons of finished iron. Brand, "Judson." Egbert Judson, President; H. E. Bothin, Vice-President; Charles Buttlar, Secretary; First National Bank of Oakland, Treasurer; P. A. Wagner, General Manager. Sales are made by the San Francisco office and by Sutton & Beebe, Portland, Oregon.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Cable address, "Nails." Works at Oakland, Alameda county. Commenced operations May 1, 1883; 2 puddling furnaces, 4 heating furnaces, rotary squeezer, one train of 3-high 14-inch rolls, one muck-bar train, one nail plate train of rolls, one hammer, 96 nail machines, and 22 wire-nail machines; product, wire nails, iron nails, and steel nails from imported slabs; annual capacity, 340,000 kegs. Also make nails of combined iron and steel. The company also has a complete wire-drawing plant, with 16 blocks, and draws wire from imported rods. Herrmann J. Sadler, President and Treasurer; Wm. F. Mau, Vice-President and Secretary; William Wright, General Agent.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 202 Market st., P. O. Box 2,032, San Francisco. Put in operation July 25, 1868; 4 single puddling and 17 heating furnaces, 6 trains of rolls, (one 8, one 10, one 12, and three 18-inch,) 4 spike and 2 rivet machines, 5 bolt headers, one pointer, 5 hot-press nut machines, 15 punching and straightening presses, 11 steam hammers, and 2 belt hammers; product, bar iron, angle iron, shafting, 12 to 60-lb. iron and steel rails, railroad, ship, and boat spikes, bridge work, bolts, (all kinds except car-

riage,) nuts, washers, boiler rivets, horse-shoe shapes, car axles, and all kinds of railroad and ship forgings; total annual capacity, 30,000 net tons. Open-hearth steel department added in 1884; one 5-ton and one 18-ton Siemens-Martin furnace; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. Proposes erecting a large train of rolls for rolling heavy structural shapes, plates, and deck beams. A horse-shoe company has been formed to be run in connection with these works, and of which this company holds control. William Alvord, President; L. B. Benchley, General Manager; C. M. Keeney, Secretary; Patrick Noble, Superintendent. Number of rolling mills and steel works in California: 4. Of these one makes open-hearth steel.

UNITED STATES.

Total number of rolling mills and steel works in the United States: 445 completed, and 11 building. Of these 41 make Bessemer steel, 8 make Clapp-Griffiths steel, 7 make Robert-Bessemer steel and one Robert-Bessemer steel plant is being built, 56 make open-hearth steel and 5 open-hearth steel plants are being built, 43 make crucible steel and 3 crucible steel plants are being built, 6 make blister steel, and 3 make special steel. A rolling mill in the United States may embrace more than one train of rolls under one management. Some of the steel works enumerated do not have trains of rolls.

ROLLING MILLS ABANDONED OR NOT LIKELY TO BE OPERATED.

NOTE.—A few of the rolling mills named in this list are supplied with good machinery, and circumstances may at some time favor their revival, but the probabilities are that none of them will again be operated for the manufacture of iron or steel.

MAINE.

Pembroke Iron Works, Pembroke, Washington county. Built prior to 1854; product, bars, bands, nails, and skelp iron.

VERMONT.

St. Albans Iron and Steel Works, St. Albans, Franklin county. Built in 1873; product, iron and open-hearth steel rails; dismantled in 1885.

MASSACHUSETTS.

- East Bridgewater Iron Company, Rogers & Sheldon, Boston. Works at East Bridgewater, Plymouth county. Built in 1837; product, nails, spikes, and tack plate; burned in February, 1888, and not rebuilt.
- Fall River Iron Works, Fall River, Bristol county. Built in 1822, and rebuilt in 1842; product, bars and nails; machinery sold in 1887.
- Globe Nail Company, Boston. Built in 1877; product, horse-nail and tack plate; machinery for sale.
- Gosnold Mills, New Bedford, Bristol county. Built in 1856; product, bars and nails; closed February, 1887, and machinery sold.
- Newton Iron Works, Newton Upper Falls, Middlesex county. Built about 1800; product, bar and rod iron; abandoned in 1880.
- Norway Steel and Iron Works, South Boston. Built in 1854; product, open-hearth steel, and bars, plates, etc.; dismantled in 1889, and part of machinery removed to Peoria, Ill.
- Old Colony Iron Works, P. H. Corr, Taunton, Bristol county. Built in 1825, and partially destroyed by fire in 1886; not likely to be operated again.
- Parker Mills, Wareham, Plymouth county. Built in 1815; product, nails; dismantled in 1887.
- Reed Brothers' Rolling Mill and Tack and Nail Works, Brockton, Plymouth county. Built in 1881-2 at Matfield, and removed to Brockton in 1886; not likely to be operated again. For sale. W. C. Flagg, Assignee.
- Somerset Iron Works, Somerset, Bristol county. Built in 1855; sold to Mount Hope Iron Works in 1887.
- Tisdale Nail Works, East Wareham, Plymouth county. Built in 1836; product, bar iron, nails, and tack plate.
- United States Navy Yard, Charlestown. Mill built in 1868; product, bar iron.
- Weymouth Iron Works, East Weymouth. Built in 1836; product, nails; company failed in 1886; dismantled in 1888.

RHODE ISLAND.

- Providence Iron Company, Providence. Built in 1845; abandoned in 1880.

CONNECTICUT.

- Birmingham Rolling Mill, Birmingham, New Haven county. Built in 1843; product, bar iron; abandoned and machinery sold in 1887.
- Greenwich Iron Works, Mianus, Fairfield county. Built in 1835; product, round and square rods.
- Hunt Canfield Iron Company, Huntsville, Litchfield county. Destroyed by fire, and not rebuilt.
- Stillwater Iron Works, Stillwater Company, Stamford, Fairfield county. Built in 1835; product, round and square rods.

NEW YORK.

- Anchor Brand Axle Works, Auburn, Cayuga county. Built in 1874; machinery removed to Wilkesbarre, Pa., in 1886, but not erected.
- Auburn Rolling Mill, E. D. Clapp Manufacturing Company, Auburn, Cayuga county. Built in 1880, and burned January 4, 1886; product, merchant bar.
- Buffalo Iron and Nail Works, Buffalo, Erie county. Built in 1847; abandoned in 1880.
- Delano Iron Works, Syracuse, Onondaga county. Built in 1865; product, rails, fish-plates, spikes, and merchant bars; dismantled in 1878.
- Lake Champlain Nail Works, Dannemora, Clinton county. Built in 1853; abandoned in 1877.
- Napanoch Rolling Mill, Napanoch Rolling Mill Company, Napanoch, Ulster county. Started up in February, 1880, after 8 years' idleness. Idle since May, 1881, and dismantled.
- Peru Steel and Iron Company, Clintonville, Clinton county. Built in 1824; product, bar iron.
- Rome Iron Works, Rome Iron Works Company, Rome, Oneida county. Built in 1866 to make rails, and afterwards used to make bar iron.
- Samsondale Iron Works, Haverstraw, Rockland county. Built in 1832; removed to Duncansville, Pa., in 1884.
- Skaneateles Iron Works, Skaneateles Falls, Onondaga county. Built in 1868; abandoned in 1880.
- Star Iron Works, Saranac, Clinton county. Built in 1878; 2 trains of rolls, operated in connection with a forge; product, bars and nail rods; idle, and not likely to run again. Owners, E. A. Carpenter, Cambridge, Mass., and F. M. Vilas, Buffalo, N. Y.
- Suffern, (James,) Suffern P. O., Rockland county. Built in 1850; product, bars.
- Troy Wire Mills, Troy. One 6-inch mill built in 1874, but only used for a short time; dismantled.
- Ulster Iron Works, Saugerties, Ulster county. Built in 1827; product, bar, rod, and hoop iron; dismantled.
- Union Iron Works, Buffalo, Erie county. Built as an iron-rail mill in 1862; product, rails, shapes, and plates; idle for a number of years, and dismantled in 1887.

NEW JERSEY.

- Bergen Iron Works, Jersey City. Built in 1852; product, plate iron and blooms; dismantled in 1879.
- Camden Rolling Mill, Camden, Camden county. Product, bars and nails.
- Collier's Iron Works, William Collier, Paterson, Passaic county. Built in 1872; product, merchant bar and horse-shoe iron.
- Elizabethport Rolling Mill, Elizabethport, Union county. Built about 1870; product, bars, angles, etc.; machinery removed in 1885.

North River Rolling Mill, Thirteenth and Henderson sts., Jersey City; product, plate iron; dismantled in 1875.

Powerville Iron Works, Powerville, Morris county. Built in 1845; abandoned in 1888, and site used for a paper mill.

Rockaway Rolling Mill, Rockaway, Morris county. Built in 1822; burned in 1883.

PENNSYLVANIA.

Anchor Brand Axle Works, Sheldon Axle Company, Wilkesbarre, Luzerne county. Works removed from Auburn, N. Y., in 1886, but rolls not erected.

Beaver Falls Rolling Mill, Beaver Falls, Beaver county. Built in 1879; product, sheet iron; burned in 1888, and not rebuilt.

Brady's Bend Iron Company, Brady's Bend, Armstrong county. Built in 1842; product, rails; dismantled in 1879.

Carbon Rolling Mill, Weissport, Carbon county. Built in 1860-4, and rebuilt in 1872; product, all kinds of merchant iron; dismantled in 1887.

Colemanville Rolling Mill, Colemanville, Lancaster county. Burned in 1875.

Crescent Nail Works, Standard Nail and Iron Company, Williamsport, Lycoming county. Works at Standard, a few miles distant. Built in 1842; burned February 17, 1886, and rebuilt the same year; partially destroyed by floods in 1889, and not rebuilt.

Danville Rolling Mill, Danville. Built in 1870; removed to Chester, Delaware county, in 1881.

Erie Rolling Mill, Erie, Erie county. Built in 1872; destroyed by fire December 9, 1883.

Gray's Ferry Iron Works, Gray's Ferry, Philadelphia. Built in 1858; product, plate iron; dismantled in 1888.

Greenwood Rolling Mill, Tamaqua, Schuylkill county. Built in 1865; dismantled in 1887.

Harrisburg Steel and Iron Works, Harrisburg. First put in operation October 16, 1881; product, horse-shoe steel and iron; dismantled in 1885, and machinery taken to Columbia.

Hibernia Forge and Rolling Mill, Wagontown, Chester county. Forge built in 1792; mill added in 1837; abandoned in 1880.

Lehigh and Franklin Wire Mills, Stewart & Co., Easton, Northampton county. Rolling mill built in 1837; product, wire rods, drawn into wire at the same establishment; rolls removed in 1884.

Middlesex Rolling Mill, West Middlesex, Mercer county. Built in 1873; removed to Lancaster, Ohio, in 1889.

Mount Carbon Rolling Mill, Mount Carbon, Schuylkill county. Bar and plate mill; burned in May, 1879.

Palo Alto Rolling Mill, Pottsville, Schuylkill county. Built in 1854; product, rails, fish-bars, and bar iron; dismantled in 1886.

- Philadelphia Iron and Steel Company, 939 North Delaware avenue, Philadelphia. Built in 1845; product, bar, angle, and tee iron, fish-plates, and peculiar shapes; dismantled in 1886.
- Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Pine Mill, built in 1845 and operated by water-power, abandoned in 1888.
- Port Carbon Iron Works, Port Carbon, Schuylkill county. Dismantled in 1888-9.
- Rogers (Wm. H.) & Co., Freeport, Armstrong county. Experimental plant for making Russia sheet iron from purchased sheets; works contained no rolls.
- Shenango Iron Works, New Castle, Lawrence county. Built in 1848; product, bars, light T rails, sheets, bands, wrought spikes, and nails; dismantled in 1885; nail machines taken to Youngstown, Ohio.
- Superior Rolling Mill, Pittsburgh. Built in 1865 to make rails; altered to make iron and steel structural material; dismantled in 1886.
- West Brandywine Iron Works, Coatesville, Chester county. Built in 1845; abandoned in 1880.

DELAWARE.

- Christiana Iron Works, Wilmington, New Castle county. Built in 1873-4; buildings destroyed by a wind storm in 1888, and machinery sold for scrap.

MARYLAND.

- Abbott Iron Works, Abbott Iron Company, Baltimore. Plate mills built in 1851; rail mill built in 1865; dismantled in 1886.
- Baltimore Steam Forge and Rolling Mills, Baltimore. Built in 1853.
- Canton Iron Works, Canton, Baltimore county. Built in 1878; dismantled in 1885.
- Mount Savage Iron Company, Mount Savage, Alleghany county. Built in 1839; dismantled in 1875.

DISTRICT OF COLUMBIA.

- Equipment Iron Rolling Mill, Navy Yard, Washington. Built in 1878; forge and anchor shop built in 1858; abandoned in 1887.

VIRGINIA.

- Graham's Forge, Wythe county. Built in 1828; abandoned in 1881.
- Lynchburg Iron Works, Lynchburg, Campbell county. Built in 1872.

WEST VIRGINIA.

- Moundsville Rolling Mill, Moundsville, Marshall county. Put in operation March 1, 1874; dismantled in 1889, and machinery removed to Iron Gate, Va.

KENTUCKY.

Central Rolling Mill, B. Du Pont, Brook st., Louisville. Built in 1849. First called Louisville Rolling Mill.

Covington Rail Mill, Covington, Kenton county. Built in 1854; dismantled in 1878.

TENNESSEE.

Memphis Rolling Mill, Memphis, Shelby county. Built in 1866; dismantled in 1879.

Nashville Iron Company, Nashville. Built in 1886; product, bar iron; machinery removed to Birmingham, Ala., in 1888.

GEORGIA.

Georgia Iron Works, Atlanta, Fulton county. Built in 1865-6; burned September 21, 1881; dismantled.

Rome Iron Works, Empire Iron Company, Rome, Floyd county. Built in 1869; dismantled in 1881.

OHIO.

Alliance Rolling Mill, Alliance, Stark county. Built in 1867; dismantled in 1878.

Ashtabula Rolling Mill, Ashtabula, Ashtabula county. Built in 1873-4; dismantled in 1879.

Bowling Green Iron and Steel Company, Bowling Green, Wood county. Commenced building a rolling mill in 1887; destroyed by a wind storm in October, 1887, after being nearly completed; buildings now used for a glass factory.

Cleveland Iron Works, Cleveland Rolling Mill Company, lessees, Cleveland. Built in 1863; dismantled. Formerly operated by the Cleveland Iron Company.

Co-operative Nail Works Company, Steubenville, Jefferson county. Built in 1885-6; abandoned and dismantled in 1887.

Empire Rolling Mill, Gest st., Cincinnati. Built in 1876.

Evans and Clifton Rolling Mill, Cincinnati. Built in 1864; dismantled in 1886.

Findlay La Grange Rolling Mills, Findlay, Hancock county. Erection of mills begun in 1887, with machinery from old La Grange Rolling Mills, at La Grange, Mo., but never completed. Sold to Aluminum Product Company, of New York.

Forest City Iron Works, Cleveland. Built in 1866-7; remodeled in 1882; burned in August, 1886.

Grasshopper Iron Works, The Arms, Bell & Co., Youngstown. Built in 1876; burned in January, 1886.

Leetonia Nail and Bolt Company, Leetonia, Columbiana county; nail machines and train of rolls for making nail plate.

- Marietta Rail Mill, Marietta, Washington county. Built in 1867; dismantled in 1886.
- Newark Rolling Mill, Newark, Licking county. Built in 1868 to roll rails; changed to a bar mill in 1875; dismantled in 1879.
- Norway Rolling Mill Company, East Front st., Cincinnati; formerly known as Cincinnati Rolling Mills. Built in 1864, enlarged in 1881, and rebuilt in 1886; dismantled in 1887.
- Sandusky Rolling Mill, Sandusky, Erie county. Built in 1873. Ran last on steel rails from purchased blooms.
- Valley Iron Company, Cleveland. Built in 1874-5. The mill was abandoned in 1880.

INDIANA.

- Aurora Iron Company, Aurora, Dearborn county. Put in operation in 1887; product, sheet iron; dismantled in 1889, and machinery removed to Anderson, Ind.
- Capital City Iron Works, Indianapolis. Idle for many years.
- Cobbs' Iron and Nail Company, Aurora, Dearborn county. Built in 1875-8; dismantled in 1889; machinery removed to Greenfield, Ind.
- Greencastle Iron and Nail Works, Greencastle, Putnam county. Put in operation in January, 1868; dismantled in 1888, and machinery removed to Muncie, Ind.
- Western Iron Company, Knightsville, Clay county. Built in 1868; dismantled in 1879.

ILLINOIS.

- Chicago Forge and Bolt Company, Chicago. Rolling mill department built in 1886; dismantled in 1888, and site used by Straight Fiber Iron Company.
- Chicago Plate and Bar Mill, J. M. Ayer, 72 Washington st., Chicago.
- East St. Louis Rail Mill, East St. Louis, St. Clair county. Built in 1865 to make rails; destroyed by fire in 1879.
- Northwestern Nail Works, Dunleith. Built in 1875-6; removed to Omaha, Neb., in 1879.
- Western Steel Company, Parkside, Cook county. Built in 1881; product, "Seymour" rolled steel horse shoes.

MICHIGAN.

- Jackson Iron Manufacturing Company, Jackson, Jackson county. Built in 1872; dismantled in 1879.
- Marquette Rolling Mill, Marquette and Pacific Rolling Mill Company, Marquette. Built in 1871; idle since 1875.

MINNESOTA.

- Standard Rolling Mill, Strothman Brothers, Minneapolis, Hennepin county. Built in 1884, and first put in operation July 1, 1884; dismantled in 1887.

MISSOURI.

Harrison Wire Company, 816 High st., St. Louis. Built in 1873; machinery removed in 1887.

La Grange Rolling Mills, La Grange, Lewis county. Built in 1883; dismantled and machinery removed to Findlay, Ohio, in 1887.

Tudor Iron Works, St. Louis. Built in 1870.

KANSAS.

Topeka Rolling Mill, Topeka. Built in 1874; product, rails; burned in 1881.

NEBRASKA.

Union Steel Nail Company, Omaha, Douglas county. Works built in 1877; first started by this company May 25, 1886; machinery removed to St. Joseph, Mo., in 1888-9.

COLORADO.

Colorado Coal and Iron Company, Pueblo, Pueblo county. Works at Denver, Arapahoe county, built in 1878; purchased by present company from the Denver Rolling Mill Company in 1880; abandoned in 1889.

UTAH TERRITORY.

Ogden Iron Works, Ogden. Begun in 1875, and completed in 1882; removed to Colorado Coal and Iron Company's mill, near Pueblo, Colorado, in 1884.

ABANDONED STEEL WORKS.

Adirondac Steel Works, Jersey City, New Jersey. Built in 1847; dismantled in 1885; product, crucible steel.

American Cast Steel Company, Cleveland, Ohio. Built in 1878 to make steel by the Bechtold process.

Atlantic Steel Works, Richardson, Boynton & Co., 232 Water st., New York; abandoned the manufacture of crucible steel in 1875.

Boston Car-wheel Company, South Boston. Built in 1886; one open-hearth furnace, not now in use.

Calumet Tool Company, Chicago. Crucible steel works built in 1879.

Carbon Iron Company, Pittsburgh. Crucible department abandoned.

Chicago Sheffield Steel Works, 149 Fulton st., Chicago. Built in 1874-5; product, crucible steel.

Cleveland Cast Steel Works, H. W. Foote, 145 Superior st., Cleveland, Ohio. Built in 1877 to make crucible steel castings.

- Cleveland Steel Company, Cleveland, Ohio. Built in 1880; product, crucible steel.
- Crucible Cast Steel Casting Company Limited, Pittsburgh, Pa. Built in 1875 to make crucible steel castings.
- Crucible Steel Casting and Metal Company, Louisville, Ky. Built in 1879-80; abandoned in 1882.
- Crucible Steel Company, 46 West Monroe st., Chicago. Works put in operation in 1885 and abandoned in 1886; operated for a few days by Kramer & Kingsland in 1887; product, crucible steel castings.
- Estate of G. F. Wilson, Providence, R. I. Product, open-hearth steel.
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Crucible department abandoned.
- Glenwood Steel Works, Glenwood Station, B. & O. R. R., Pittsburgh. Built in 1879; product, open-hearth steel.
- Goddard & Poulterer, Front and Laurel sts., Philadelphia. Started a crucible steel works in the Disston building in 1885, but abandoned it the same year.
- Joseph W. Howard Limited, corner Albany and Swett sts., Boston, Mass. First steel made in September, 1883; product, crucible steel castings.
- Millvale Rolling Mill, Pittsburgh. Clapp-Griffiths converter removed from Port Henry, N. Y., in 1887; sold to the Mexican Iron Mountain Manufacturing Company, and shipped to Durango, Mexico, in 1888.
- North River Steel Works, Thirteenth and Henderson sts., Jersey City, New Jersey. Built in 1875; product, crucible steel.
- Norway Steel and Iron Works, South Boston, Mass. Three 10-gross-ton Siemens-Martin open-hearth furnaces; dismantled in 1889.
- Pittsburgh Steel Works, Ross st. and First avenue, Pittsburgh. Built in 1845; product, crucible steel.
- Port Henry Steel and Iron Company Limited, Port Henry, N. Y. Built in 1885-6; product, Clapp-Griffiths steel; converter removed to Millvale Rolling Mill, Pittsburgh, in 1887.
- Read & Thaw, North and Irwin avenues, Allegheny City, Pa. Built in 1878; product, crucible steel castings.
- St. Albans Iron and Steel Works, St. Albans, Vermont. Built in 1873; product, open-hearth steel.
- Solid Steel Casting Company, North Newark, Essex county, New Jersey. Built in 1884; product, crucible steel castings.
- Standard Steel Casting Company, Thurlow, Delaware county, Pa. Crucible department abandoned.
- Trenton Iron Company, Trenton, New Jersey. One small experimental Bessemer converter, built in 1886; torn down.
- Washington Steel Works, Reading, Pa. Built in 1885; product, open-hearth and crucible steel castings; abandoned in 1885.
- Wheeling Steel Works, Martin's Ferry, Ohio. Built in 1873-4; product, crucible steel.

FORGES.

NOTE.—Under this title are embraced all works which make wrought iron from ore. All direct processes are included under this head.

VERMONT.

East Middlebury Iron Works, East Middlebury, Addison county. Rebuilt in 1880; 4 fires and one hammer; product, charcoal blooms for steel; annual capacity, 1,300 net tons. Owned by B. S. Nichols and the National Bank of Middlebury. The works have been idle since 1885.

Number of forges in Vermont: one.

NEW YORK.

ALL LOCATED IN THE LAKE CHAMPLAIN DISTRICT.

Altona Bloom Iron Works, G. W. & F. Palmer & Co., Alder Bend, Clinton county. Telegraph address, Altona. Built in 1880; 6 fires; water-power; product, charcoal blooms for boiler plate and sheet iron, made from Chateaugay ore; annual capacity, 2,400 net tons. (The forge at Altona, built in 1868, has been abandoned.)

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Four works. Plattsburgh Iron Works were built at Plattsburgh in 1879 as a rolling mill; converted into a forge in 1883; 4 fires and one hammer. Chateaugay Lake Iron Works were built at Chateaugay Lake, Franklin county, in 1875; 16 fires and 3 hammers. Clayburgh Iron Works were built at Clayburgh, Clinton county, in 1844; rebuilt and enlarged in 1883; 7 fires and one hammer. Russia Iron Works were built at Moffittsville, Clinton county, in 1844; enlarged in 1883; 7 fires and one hammer. All run by water-power; product, charcoal blooms for general purposes, made from Chateaugay ore; total annual capacity, 12,000 net tons. Smith M. Weed, President, M. F. Parkhurst, Cashier, and A. L. Inman, General Manager, Plattsburgh; H. M. Olmsted, Treasurer, and F. J. Dominick, general sales agent, 21 Cortlandt st., New York. *See Charcoal Furnaces.*

Horicon Iron Company, 24 Cliff st., New York. Works at Ticonderoga, Essex county. Built in 1865; 6 fires and 2 steam hammers; product, charcoal blooms for steel. Cyrus Butler, President and Treasurer. Idle since 1883, but company contemplates operating it again soon, using a patented fuel.

Keene Forge, W. F. & S. H. Weston, Keene, Essex county. Built in 1880; 6 fires and one hammer; water-power; product, charcoal blooms and billets for boiler plate and steel, made from Keene ore. Brand, the letter W in a circle. Idle since 1887. *See Wilmington Forge.*

Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; 4 fires and one hammer; water-power; product, charcoal blooms suitable for best boiler plate; annual capacity, 2,000 net tons.

Peru Steel Ore Company Limited, Clintonville, Clinton county. Built in 1837; 16 fires and 4 hammers; water-power; product, charcoal blooms for steel; annual capacity, 5,000 net tons. George H. Cleaves, President; E. K. Baber, Vice-President; Charles M. Hopkins, Secretary and Treasurer.

Peterburgh Iron Works, Peter Tremblay, Clayburgh, Clinton county. Forge at Peterburgh. Four fires and one hammer; water-power; product, charcoal blooms for steel. Idle.

Sable Iron Works, J. and J. Rogers Iron Company, Ausable Forks, Essex county. One forge at Ausable Forks, built in 1848; 4 fires. Two forges at Black Brook, Clinton county, built in 1832; 12 fires. One forge at Jay, Essex county, built in 1809; 6 fires. Total, 22 fires, with 5 hammers; water-power; product, charcoal blooms for best tool steel; total annual capacity, 8,000 net tons. *See Rolling Mills in New York.*

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; 4 fires and one hammer; water-power; product, charcoal blooms for boiler plate and for miscellaneous steel purposes, made from Keene ore. Brand, two W's in circles. Idle since 1887. *See Keene Forge.*

William W. Wood, Wood's Falls, Clinton County. Built in 1863, and rebuilt in 1872; 10 fires, (3 of which are knobbling fires,) one run-out fire, one cupola for casting, and 2 hammers; water-power; product, charcoal blooms, made usually from ore, but occasionally made from scrap iron; annual capacity, 4,000 net tons. *See Rolling Mills in New York.*

Number of forges in New York: 16.

NEW JERSEY.

Rockaway Forge, D. T. Warren, Rockaway, Morris county. Office, 32 Warren st., New York. One Wilson deoxidizer, one steam hammer, and one scrap furnace; product, charcoal blooms for steel purposes, made from ore, and scrap bars. Idle and for sale. *See Rolling Mills in New Jersey.*

Number of direct process works in New Jersey: one.

TENNESSEE.

Little Doe Forge, William A. Morley, High Health, Johnson county.

Forge on Little Doe creek, 13 miles west of Taylorsville; 2 forge fires and 2 hammers; water-power; product, bar iron, made from ore.

Morrison's Forge, Nat. Morrison, Head of Laurel P. O., Johnson county.

Forge on Laurel creek, 7 miles from Taylorsville. Built in 1879; 3 fires and one hammer; water-power; product, bar iron, made for local use.

Mud Splatter Forge, M. M. Wagner's Sons, Howard's Iron Works P. O., Johnson county. Built in 1867.

Number of forges in Tennessee: 3.

NORTH CAROLINA.

Roan Mountain Steel and Iron Company, Magnetic City, Mitchell county. Built in 1875; 3 forge fires and one hammer; water-power; product, charcoal blooms, made from ore. A. G. Wetherby, Superintendent of works.

Tom's Creek Forge, J. L. & D. W. Worth. Forge on Tom's creek, Surry county. Built in 1862; 2 fires and one hammer; product, bar iron.

Owners, J. L. Worth, Mt. Airy, and D. W. Worth, Pilot Mountain.

Number of forges in North Carolina: 2.

Total number of iron-ore forges and direct-process works in the United States: 23.

BLOOMARIES.

NOTE.—Under this title are embraced all works which hammer blooms from pig or scrap iron. Many plate, sheet, and wire makers have charcoal forge fires in their mills making blooms exclusively for their own use, but such establishments are not included in this list.

NEW JERSEY.

Bloomington Forge, A. Zabriskie Ryerson, Bloomington, Passaic county. Built in 1800, and rebuilt in 1841; 3 fires and one hammer; water-power; product, charcoal blooms for boiler plate and wire, made from scrap iron. Idle.

King Brothers, Drakesville, Morris county. Built about 1865; 2 fires and one hammer; product, scrap blooms; daily capacity, 5 net tons.

Paterson Bloomary, Peter Oberg & Co., Paterson, Passaic county. Built in 1878; 4 fires and one hammer; product, cold blast charcoal blooms

and charcoal iron for boiler plate and wire, made from scrap iron; annual capacity, double turn, 2,500 net tons. Idle.

Port Oram Forge, Port Oram Manufacturing Company, Port Oram, Morris county. Built in 1878; started in August, 1878; 8 forge fires, one run-out fire, and 2 hammers; product, charcoal blooms, made from scrap and pig iron, used for all purposes; annual capacity, double turn, 4,500 net tons. Robert F. Oram, President; T. W. Oram, Secretary; Edward S. Hance, Treasurer and Superintendent.

Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built about 1800; 3 forge fires and one hammer; water-power; product, charcoal blooms for wire, made from scrap iron; annual capacity, double turn, 1,000 net tons.

Steam Forge, Rockaway, Morris county. Built in 1878; 4 forge fires and one hammer; product, charcoal blooms for boiler plates, wire, and flange iron, made from scrap iron; annual capacity, 1,300 net tons. Owned by B. B. Oram. Idle.

Warren Forge, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1875; one 4-tuyere run-out, 3 forge fires, and one steam hammer; product, charcoal blooms for sheet iron, made from pig iron; annual capacity, 1,000 net tons. *See Rolling Mills.*

Number of bloomaries in New Jersey: 7.

PENNSYLVANIA.

Carlisle Iron Works, J. C. Bucher, Boiling Springs, Cumberland county. Built in 1760, and rebuilt in 1860; 5 forge fires and one hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 2,200 net tons.

Cove Forge, Wm. McIlvain & Sons, Reading. Works at Duncannon, Perry county. First put in operation in 1864; 5 fires, one refinery, and one hammer; blast operated by water-power and hammer by steam-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,200 net tons. Idle. *See Eastern Pennsylvania Rolling Mills.*

Eagle Forge, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1809; 8 fires and one hammer; water-power; product, blooms for general purposes, made from charcoal pig iron; specialties, blooms for boiler plate and rivet and screw rods; annual capacity, 2,000 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

French Creek Forge, Esther Kaufman, St. Peter's P. O., Chester county. Built in 1872; 4 fires and one hammer; water-power; product, charcoal blooms, made from scrap iron. Thomas Wanner, Attorney.

Gibraltar Iron Works, Simon Seyfert, Reading, Berks county. Rebuilt in 1846; one coke run-out, 4 charcoal forge fires, and 2 hammers;

- water-power; product, charcoal blooms for flue iron and boiler plate; annual capacity, 800 net tons. *See Eastern Pennsylvania Rolling Mills.*
- Howard Iron Works, Jenkins Brothers & Lingle, Bellefonte. Works at Howard, Centre county. Built in 1879; 10 fires, one 6-tuyere run-out, and one steam hammer; steam and water power; product, charcoal blooms; annual capacity, 3,000 net tons. *See Central Pennsylvania Rolling Mills.*
- Laurel Forge, South Mountain Mining and Iron Company, Pine Grove Furnace, Cumberland county. Built in 1830; 6 fires, one double run-out, and one hammer; water-power; product, charcoal blooms, made from Pine Grove pig iron; annual capacity, 2,000 net tons. Joseph Fuller, Superintendent. *See Charcoal Furnaces.*
- Lebanon Rolling Mills, Lebanon. Forge built in 1885-6; 6 fires and one hammer; product, blooms for plate and sheet iron, made from scrap; weekly capacity, 90 net tons. Samuel E. Light, President; Richard Meily, Treasurer; J. H. Roberts, Secretary. *See Central Pennsylvania Rolling Mills.*
- Lucknow Forge, John W. Reily, Harrisburg. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 8 forge fires and one steam hammer; product, blooms for boiler plate, sheet iron, wire, etc., made from pig and scrap iron; annual capacity, 3,500 net tons.
- Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 fires and one hammer; water-power; product, charcoal blooms for boiler plate and best wire, made from pig iron. Wire used for flat and round head wood-screws and for best grade of carriage bolts. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Mont Alto Iron Works, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph in office at Mont Alto connecting with Western Union office at Chambersburg. Built in 1866; 8 Wiestling's patent improved Lancashire hearths and a double run-out fire; one Nasmyth steam hammer and one self-acting steam helve hammer; product, charcoal blooms for all purposes requiring best quality; annual capacity, 4,000 net tons. Brand, "Mont Alto." General office at the works, and all sales made by the General Manager, George B. Wiestling. *See Charcoal Furnaces.*
- Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862; 7 forge fires, one run-out fire, and one hammer; water and steam power; product, charcoal and anthracite blooms for boiler plate, sheet iron, wire, etc., made from pig and scrap iron; annual capacity, 2,800 net tons.
- Spring City Forge, Francis & Co., Spring City, Chester county. Built in 1884; 6 forge fires and one hammer; product, blooms, used for plate and sheet iron, made from scrap iron; daily capacity, double turn, 14 net tons.

Springton Forge, Wallace, Chester county. Built in 1790, and rebuilt in 1881; 4 forge fires, one run-out, and one hammer; water-power; product, charcoal blooms. Owned by Jerome Keeley, 206 Walnut Place, Philadelphia.

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Office, Trust Building, Harrisburg. Established in 1809, rebuilt in 1870; 8 fires, one double run-out, and one hammer; the blast is operated by water-power and the hammer is operated by steam-power. *See Rolling Mills.*

Number of bloomaries in Pennsylvania: 15.

MARYLAND.

Northeast Forge, McCullough Iron Company, Northeast, Cecil county. Built in 1847 and 1875; 18 fires and 2 hammers; product, charcoal blooms, for sheet iron exclusively, made from pig iron; annual capacity, 6,000 net tons. *See Rolling Mills in Delaware and Maryland.*

Principio Forge, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Whitaker Station, Baltimore and Ohio Railroad. Built in 1883-4; 12 fires, one heating furnace, and one hammer; coke run-out attached; steam-power used throughout; product, charcoal blooms for sheet iron, used principally by the Whitaker Iron Company, of Wheeling, W. Va. G. P. Whitaker, President. *See Furnaces.*

Number of bloomaries in Maryland: 2.

VIRGINIA.

Eagle Forge, Wythe and Speedwell Mining and Iron Manufacturing Company, Crockett Depot, Wythe county. Built in July, 1882; 2 fires; product, bar iron for local use, made from pig iron. *See Charcoal Furnaces.*

Pine Forge, J. C. Frederick & Co., Mount Jackson, Shenandoah county. Rebuilt in 1874; one charcoal forge fire, 2 hammers, one refinery, and 3 knobbling fires; water-power; product, charcoal blooms and bars. For sale.

Number of bloomaries in Virginia: 2.

ALABAMA.

Anniston Bloomary, Cherokee Iron Company, Cedartown, Georgia. Works at Anniston, Calhoun county. Built in 1887; 5 forge fires and one hammer; steam-power; product, blooms, made from pig iron. Contemplates removing plant to Georgia. *See Furnaces.*

Number of bloomaries in Alabama: one.

Total number of pig and scrap bloomaries in the United States: 27.

ABANDONED FORGES AND BLOOMARIES.

MAINE.

O. S. Thomes, Cumberland Centre, Cumberland county. Forge at Webb's Mills. Built in 1883.

VERMONT.

Fairhaven Iron Works, Fairhaven, Rutland county. Built in 1796.
Pittsfield Iron and Steel Company, Pittsfield, Rutland county. Works at Chittenden, Rutland county. Built in 1881-2.

MASSACHUSETTS.

Mount Hope Iron Works, East Bridgewater, Plymouth county. Office at Somerset, Bristol county. Built in 1840.

CONNECTICUT.

Canton Bloomary, Collinsville, Hartford county. Built in 1880; idle, and not likely to run again.

NEW YORK.

Altona Bloom Iron Works, Alder Bend, Clinton county. Forge at Altona, built in 1868; abandoned.
Crown Point Iron Company, Ironville, Essex county. Built in 1828, and rebuilt in 1879; idle since 1886.
Irona Forge, J. F. Reynolds, Irona. Built in 1868; dismantled.
John Merchant's Forge, Schuyler Falls, Clinton county. Built in 1844.
Kingdom Forge, Essex and Lake Champlain Ore and Iron Company, Elizabethtown, Essex county. Built in 1825.
Lake Champlain Forge, State Prison Yard, Dannemora, Clinton county. Built in 1865; abandoned in 1877.
Lewis Iron Works, Stower & Esmond, Lewis, Essex county. Built in 1837, and rebuilt in 1875.
Merriam & Rouse, Westport, Essex county.
New Russia Iron Works, H. A. Putnam, Elizabethtown, Essex county. Forge at New Russia. Rebuilt in 1879-80; dismantled.
Paradox Iron Works, Schroon River, Essex county. Built in 1864.
Plattsburgh Iron Works, Plattsburgh, Clinton county. Built in 1878.
Rockville Forges, Altona, Clinton county. Two forges, 3 miles apart. Built in 1874 and 1879; one burned and one dismantled.
Schroon River Iron Works, Schroon River, Essex county. Built in 1857; burned in 1881.
Star Iron Works, Saranac. Three forges in Clinton county: two at Saranac, built in 1844, and one at Redford, built in 1880; abandoned.

Stone Forge, Nichols & Hull, Plattsburgh, Clinton county. Built in 1835.

Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835; abandoned in 1883.

NEW JERSEY.

Powerville Forge, B. F. Howell, Morristown. Works at Powerville. Built in 1845; abandoned.

Split Rock Forge, Morris county. Built in 1797.

Windham Forge, Stockholm, Sussex county. Idle, and not likely to run again.

PENNSYLVANIA.

Allegheny Forge, Martinsburg, Blair county. Built in 1831; abandoned in 1879.

Barree Forge, Barree Forge P. O., Huntingdon county. Built in 1785.

Bellefonte Iron Works, Bellefonte, Centre county. Built in 1810.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. One Siemens rotator, abandoned and wrecked in 1884.

Castle Fin Forge, James K. Brown, Castle Fin, York county. Built in 1835; abandoned in 1874.

Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Built before 1749; idle since 1887, and the dam washed away by freshets in 1889.

Cold Spring Forge, Tyrone, Blair county.

Colemanville Works, Colemanville, Lancaster county. Built in 1828.

Coleraine Forge, Shorb, Stewart & Co., Coleraine, Huntingdon county.

Cove Forge, Estate of John Royer, Williamsburg, Blair county. Works on Frankstown branch, 2 miles from Williamsburg. Built in 1811.

Ellendale Forge, J. H. Lick & Co., Ellendale Forge, Dauphin county. Built in 1838, and rebuilt in 1872; abandoned.

Ellwood Forge, Dr. G. N. Eckert's Heirs, Ellwood, Schuylkill county. Built in 1863; idle since 1879, and not likely to run again.

Franklin Forge, James Gardner, Hollidaysburg, Blair county.

Juniata Forge, Petersburg, Huntingdon county. Damaged by floods in 1889.

Juniata Iron Works, Samuel Hatfield, Alexandria, Huntingdon county. Built in 1837.

Liberty Forge, Lisburn, Cumberland county. Built in 1836; dismantled.

Lickdale Forge, Lickdale Iron Company, Lebanon. Forge at Lickdale. Built about 1790; torn down in 1884, and a new forge erected.

Logan Works, Lewistown, Mifflin county.

Mainville Forge, Charles Reichart, Mainville, Columbia county. Built in 1824.

Maria Forge, G. W. Smith, Sarah, Blair county.

- Martie Forge, Colemanville, Lancaster county. Built in 1755. Idle since 1883, and will never run again.
- Mary Ann Forge, Downingtown, Chester county. Built in 1785.
- Monroe Forge, Lebanon county.
- Mount Airy Forge, Shartlesville, Berks county. Built about 1840.
- Mount Etna Forge, Samuel Isett, Yellow Springs P. O., Blair county. Built in 1808.
- Moyer's Forge, Jacksonwald, Berks county. Built in 1836.
- New Market Forge, Theodore B. Klein, Syner, Lebanon county. Rebuilt in 1860. Not in operation since 1885, and from present appearances will not be used in the future as a forge, having no railroad facilities.
- North Kiln Forge, M. B. Seyfert & Co., Shartlesville, Berks county. Built in 1830.
- Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county.
- Sadsbury Forge, Charles Goodman & Brother, Atglen, Chester county. Built about 1820.
- Schuylkill Steam Forge, Douglassville, Berks county. Built in 1878; converted into a rolling mill in 1887.
- Siemens-Anderson Steel Company's Forge, Pittsburgh, Allegheny county. Three Siemens rotators. Owned by the Linden Steel Company Limited, of Pittsburgh.
- Washington Forge, Lamar, Clinton county.
- West Middlesex Forge, West Middlesex, Mercer county. Built to produce iron direct from the ore.

VIRGINIA.

- Bowling Green Forge, Bales' Mills, Lee county. Built in 1829.
- Columbia Forge, Columbia Furnace P. O., Shenandoah county.
- Crockett, Sanders & Co., Wytheville, Wythe county. Built in 1863.
- Graham's Forge, Graham's Forge P. O., Wythe county. Built in 1827; dismantled in 1884.
- Gray Eagle Forge, Red Bluff, Wythe county. Built in 1862.
- Henry R. Haines, Alexandria. Built a forge in 1886.
- Liberty Forge, Liberty Furnace P. O., Shenandoah county. Built in 1821.
- Milnes Iron Works, Shenandoah Iron Company, Milnes, Page county. Built in 1871; abandoned and torn down.
- Mockasine Forge, Estillville, Scott county. Built in 1851.
- Mount Vernon Iron Works, Abbott Iron Company, Baltimore, Md. Works near Weyer's Cave, Rockingham county. Built in 1848.
- Penington's Forge, Jonesville, Lee county. Built in 1873.
- Porter's Forge, Speedwell, Wythe county. Built in 1865.
- Reed Island Forge, Allisonia, Pulaski county. Built in 1875.
- Wilkinson's Forge, in Carroll county.

WEST VIRGINIA.

Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county.
Built in 1874.

KENTUCKY.

Red River Forge, Fitchburg, Estill county.

TENNESSEE.

Camp Creek Forge, Jones & Kennedy, Camp Creek, Greene county.
Built about 1815.

Chief Creek Forge, Napier Iron Company, Napier Furnace, Lawrence county. Built in 1860.

Click's Forge, Green Click, Middle Creek, Sevier county. Forge on Middle creek, Greene county, 7 miles southeast of Greeneville; abandoned and rotted down.

Dugger's Forge, Stump Knob, Johnson county. Forge near Watauga river. Built in 1820.

Hampton Iron Works, on Doe river, in the Crab Orchard, 18 miles southeast of Elizabethton, Carter county.

Jackson's Forge, in Unicoi county, on Clarke's creek, 15 miles south of Jonesboro.

King's Works, Shady, Johnson county. Built in 1838.

Laurel Iron Works, T. G. McConnell, Abingdon, Virginia. Works at Laurel Bloomary, Johnson county. Built in 1824.

McQueen's Forge, Baker's Gap, Johnson county. Forge on Roane creek, 10 miles southeast of Taylorsville, built in 1877.

Nave's Forge, John Nave, Watauga, Carter county. Forge on Stony creek, 6 miles north of Elizabethton.

Northington's Forge, Shady, Johnson county.

Potter's Forge, on Roane creek, 4 miles southeast of Taylorsville. Built in 1867-8.

Rhea's Forge, Shoun's Cross Roads, Johnson county. Built in 1880; will never run again.

Roane Creek Forge, Shoun's Cross Roads, Johnson county. Built in 1859.

Rocky Ford Forge, J. W. McQueen, Shoun's Cross Roads, Johnson county. Built in 1875.

Sand Hill Forge, Baker's Gap, Johnson county. Forge on Roane creek, 8 miles southeast of Taylorsville. Built in 1852.

Shupe's Forge, Thomson Shupe, Shady, Johnson county. Built in 1872.

Smith's Forge, John Smith, Watauga, Carter county. Forge on Stony creek, 10 miles north of Elizabethton.

Speedwell Forge, Harbison & Longmire, Speedwell, Claiborne county. Built in 1873-4.

Speedwell Forge, Knoxville Car-wheel Company, Knoxville. Forge at Stony Creek, Carter county.

Valley Forge, H. C. Smith, Elizabethton, Carter county. Forge on Doe river, 3 miles southeast of the village. Built in 1820.

Wagner's Forges, M. M. Wagner's Sons, Taylorsville, Johnson county. Two forges on Little Doe creek, 7 and 9½ miles west of Taylorsville.

Walker's Forge, George J. Walker, Pandora, Johnson county. Forge on Little Doe creek, 8 miles west of Mountain City.

NORTH CAROLINA.

Brevard's Forge, on Dutchman's creek, Lincoln county.

Catawba Valley Iron Works, John W. Blackwelder, Catawba, Catawba county. Built in 1874.

Cranberry Forge, Mitchell county.

Henson's Forge, H. Warlick, Murphy, Cherokee county. Built in 1840; abandoned.

Hyatt's Forges, Martin Hyatt, Mount Airy, Surry county. Two forges on Bull run, Stokes county.

Madison Forge, Jonas W. Derr, Lincolnton, Lincoln county. Built about 1830.

Maiden Creek Forge, Maiden, Catawba county. Built about 1825. Rotted down.

Owl Creek Forge, Mercer Fain, Murphy, Cherokee county. Built in 1852.

Rehoboth Forge, John Leonard & Co., Iron Station, Lincoln county.

Rocky Point Forge, Murphy, Cherokee county. Rebuilt in 1870; abandoned.

Tomatola Forge, Tomatola Iron Company, Tomatola, Cherokee county. Built in 1869.

Tuscarora Forge, North Carolina Centre Iron and Manufacturing Company, Guilford county. Built in 1869.

GEORGIA.

Allatoona Creek Forge, Lewis T. Erwin, Allatoona, Bartow county. Built in 1878-9.

OHIO.

Paulding Forge, Cecil, Paulding county. Built in 1867; abandoned and dismantled in 1889.

MISSOURI.

Germania Iron Works, Anthony Zeitinger, South St. Louis, St. Louis county. Built in 1871.

Maramec Iron Company, Maramec Iron Works, Phelps county. Built in 1828.

Kimmswick Forge, Kimmswick, Jefferson county. Built in 1873; dismantled.

PLATE AND SHEET MILLS.

NOTE.—Mills making only nail plate, tack plate, or shovel plate are not included in this list. Mills put down as making iron plates or sheets, it will be understood, are rapidly changing to use steel. For a complete description of the works enumerated below see the list of rolling mills and steel works.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. Iron and steel plates.

MASSACHUSETTS—2.

Bay State Iron Company, 12 Pearl st., Boston. Steel plates.

Tremont Nail Company, West Wareham, Plymouth county. Steel plates.

NEW YORK—2.

Elmira Iron and Steel Rolling Mill Company, Elmira. Iron plates.

Troy Steel and Iron Company, Troy. Steel sheets.

NEW JERSEY—3.

American Sheet Iron Company, Phillipsburg. Iron sheets.

Columbia Rolling Mill Company, Jersey City. Taggers iron.

Paterson Iron Company, Paterson. Iron and steel plates.

PENNSYLVANIA—EASTERN DISTRICT—29.

Bethlehem (The) Iron Company, South Bethlehem. Heavy iron and steel armor and other plates.

Brandywine Rolling Mills, Worth Brothers, Coatesville. Iron and steel plates.

Catasauqua Manufacturing Company, Catasauqua. Iron and steel plates.

Chester Rolling Mills, Thurlow, Delaware county. Iron and steel plates.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, 223 North Second st., Philadelphia. Works at Conshohocken. Iron plates and sheets.

Easton Sheet Iron Works, Theodore Oliver, Easton. Iron sheets.

Gibraltar Iron Works, Simon Seyfert, Reading. Iron plates.

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown. Iron and steel plates.

Hughes & Patterson, Richmond & Otis sts., Kensington, Philadelphia. Iron plates.

- Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Steel plates.
- Keystone Iron Works Limited, Reading. Iron plates.
- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. Steel sheets and plates.
- Laurel Iron Works, operated by Coatesville Iron Works, Coatesville. Iron plates.
- Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Iron and steel plates.
- McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Iron plates.
- Parkesburg Iron Company, Parkesburg. Iron and steel plates.
- Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Iron sheets and plates.
- Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Iron and steel plates.
- Plymouth Rolling Mill, Conshohocken. Iron and steel plates and sheets.
- Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown. Iron plates.
- Pottstown Iron Company, Pottstown. Iron and steel plates.
- Reading Iron Company, Reading. Iron plates.
- Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken. Iron and steel plates and sheets.
- Seyfert Rolling Mills, Samuel R. Seyfert, Reading. Iron plates.
- Thorndale Iron Works Company, Thorndale, Chester county. Iron plates.
- Valley Iron Works, W. W. Kurtz & Sons, Coatesville. Iron plates.
- Viaduct Iron Works, Coatesville Rolling Mill Company, Coatesville. Iron and steel sheets.

PENNSYLVANIA—CENTRAL DISTRICT—6.

- Central Iron Works, Harrisburg. Iron and steel plates.
- Lebanon Rolling Mills, Lebanon, Lebanon county. Iron plates.
- North Branch Steel Company, 330 Walnut st., Philadelphia. Works at Danville. Steel plates.
- Paxton Rolling Mills, Harrisburg. Iron plates.
- Pennsylvania Steel Company, 208 South Fourth st., Philadelphia. Works at Steelton, Dauphin county. Steel plates.
- York Rolling Mill, Schall, Steacy, and Denney Company, (incorporated,) York. Iron plates.

PENNSYLVANIA—WESTERN DISTRICT—38.

- Allegheny, Monongahela, and Birmingham Iron Works, Oliver Iron and Steel Company, Pittsburgh. Iron and steel plates.

- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Iron and steel plates and sheets.
- Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. Two mills. Iron and steel plates.
- Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Iron and steel sheets.
- Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Iron and steel sheets.
- Arethusa Iron Works, George W. Johnson, New Castle. Iron plates and sheets.
- Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Steel plates and sheets.
- Byers (A. M.) & Co., Pittsburgh. Iron plates and sheets.
- Canonsburg Iron and Steel Company, Canonsburg, Washington county. Iron and steel sheets.
- Carbon Iron Company, Thirty-second and Smallman sts., Pittsburgh. Steel plates.
- Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Three mills. Iron and steel armor and other plates.
- Chartiers Iron and Steel Company Limited, Pittsburgh. Iron and steel sheets.
- Clinton Rolling Mill, Clinton Iron and Steel Company, Pittsburgh. Iron and steel plates and sheets.
- Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. Steel plates and sheets.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Iron and steel plates and sheets.
- Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Iron plates and sheets.
- Kimberly (P. L.) & Co., Sharon, Mercer county. Iron plates.
- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Iron Exchange Building, Pittsburgh. Iron and steel sheets.
- Linden Steel Company Limited, Pittsburgh. Steel armor and other plates and sheets.
- McKeesport Iron Works, W. Dewees Wood Company, McKeesport, Allegheny county. Branch office, Pittsburgh. Iron sheets.
- Millvale Rolling Mill, Millvale Iron Company Limited, lessee, Pittsburgh. Iron and steel plates.
- Myers (H. M.) & Co. Limited, Beaver Falls. Steel sheets, used by the firm for shovels, etc.
- National Tube Works Company, McKeesport, Allegheny county. Iron and steel boiler plates.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. Works at Chartiers. Steel plates and sheets.

- Republic Iron Works, Pittsburgh. Iron plates and sheets.
Scottdale Iron and Steel Company Limited, Scottdale, Westmoreland county. Iron sheets.
Sharon Iron Company, Sharon, Mercer county. Iron plates and sheets.
Singer, Nimick & Co. Limited, Pittsburgh. Steel plates.
Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Iron plates and sheets.
Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Iron and steel plates and sheets.
Spang Steel and Iron Company Limited, Pittsburgh. Works at Etna. Steel plates.
United States Iron and Tin Plate Company Limited, Demmler P. O., Allegheny county. Iron and steel plates and sheets.
Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Works at Sharpsburg. Iron plates and sheets.
Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Iron boiler plates.
West Penn. Steel Works, Jennings Brothers & Co. Limited, Safe Deposit Building, Pittsburgh. Works at Leechburg, Armstrong county. Steel plates and sheets.

DELAWARE—6.

- Delaware Iron Works, Alan Wood Company, 519 Arch st., Philadelphia, Pa. Works at Wooddale, New Castle county. Iron sheets.
Marshallton Iron Works, (incorporated,) Marshallton. Iron sheets.
Minquas Iron Works, McCullough Iron Company, 1600 Washington avenue, Philadelphia, Pa. Works at Wilmington. Iron sheets.
Newport Rolling Mills, Marshall Iron Company, Newport. Iron and steel sheets.
Riverside Iron Company, lessee, New Castle, New Castle county. Iron plates.
Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Iron and steel boiler plates.

MARYLAND—5.

- Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland. Office, Mount Clare, Baltimore. Iron plates. Idle.
Locust Point Iron and Steel Works, Coates & Co., Baltimore. Iron and steel plates.
McCullough Iron Company, (1600 Washington avenue, Philadelphia, Pa.,) Northeast, Elkton, and Rowlandville, Cecil county. Iron sheets.

VIRGINIA—1 BUILDING.

- Iron Gate Iron and Steel Company, Iron Gate, Alleghany county. Building, to make iron and steel plates and sheets.

WEST VIRGINIA—1.

Crescent Iron Works, Whitaker Iron Company, Wheeling. Iron sheets.

KENTUCKY—6.

Anchor Iron and Steel Works, L. M. Dayton, 94 West Second st., Cincinnati, Ohio. Works at Newport, Campbell county. Iron plates and sheets.

Ewald Iron Company, 941 North Second st., St. Louis, Mo. Two mills: Tennessee Rolling Works in Lyons county, and Tennessee Rolling Mills at Louisville. Iron and steel plates and sheets.

Licking Iron Works, Licking Rolling Mill Company, Covington. Iron plates and sheets.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati, Ohio. Works at Covington. Iron and steel plates and sheets.

Newport Iron and Steel Works, Newport. Iron and steel plates and sheets.

ALABAMA—2.

Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Iron plates and sheets.

Birmingham Rolling Mill Company, Louisville, Ky. Works at Birmingham. Iron plates and sheets.

OHIO—22 COMPLETED AND 1 BUILDING.

Etna Iron and Steel Company, Bridgeport, Belmont county. Iron and steel plates and sheets.

Britton Iron and Steel Company, Cleveland. Iron and steel plates and sheets.

Burgess Steel and Iron Works, Portsmouth, Scioto county. Iron and steel boiler plates.

Cambridge (The) Iron and Steel Company, Cambridge, Guernsey county. Building, to roll iron and steel sheets.

Cincinnati Iron and Steel Company, Cincinnati. Works at Riverside, Hamilton county. Iron and steel plates and sheets.

Cleveland Rolling Mill Company, Cleveland. Iron and steel plates and sheets.

Falcon Iron and Nail Company, Niles. Two mills. Iron sheets.

Globe Rolling Mill Company, 163 and 165 West Pearl st., Cincinnati. Iron plates and sheets.

Haselton Iron Works, The Andrews Brothers Company, Youngstown. Iron and steel plates and sheets.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Iron and steel sheets.

Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton. Iron plates and sheets.

- Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. Iron plates and sheets.
- Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown. Iron plates and sheets.
- Maumee Rolling Mill Company, Toledo, Lucas county. Iron and steel plates and sheets.
- New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Iron and steel plates and sheets.
- Niles Rolling Mill, Coleman, Shields & Co., Niles, Trumbull county. Iron sheets.
- Otis (The) Steel Company Limited, Cleveland. Steel plates.
- Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth. Iron and steel plates and sheets. Idle.
- Russia Mill, Joshua S. Ingalls & Co., Troy, Miami county. "Craig" polished sheet steel.
- Standard (The) Iron Company, Bridgeport, Belmont county. Iron and steel plates and sheets.
- Summers Iron Works, Summers Brothers & Co., Struthers, Mahoning county. Iron sheets.
- Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Iron and steel plates and sheets.

INDIANA—1 BUILDING.

- Iron Dale Steel and Iron Company, Anderson, Madison county. Building, to roll iron and steel plates and sheets.

ILLINOIS—2.

- Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. Steel plates and sheets.
- Union Works, Illinois Steel Company, Chicago. Plate mill not now in operation.

MICHIGAN—1.

- Eureka Iron and Steel Works, Detroit. Iron plates.

MISSOURI—3.

- Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Iron and steel sheets.
- Laclede Rolling Mills, Chouteau, Harrison & Vallé Iron Company, 204 North Third st., St. Louis. Iron and steel plates and sheets.
- Union Steel and Iron Company, St. Joseph. Iron and steel sheets.

UNITED STATES.

- Total number of iron and steel plate and sheet mills in the United States: 129 completed, and 3 building.

CUT-NAIL MILLS.

NOTE.—This list embraces all rolling mills in the United States which have cut-nail machines. For a complete description of the works enumerated below see the list of rolling mills and steel works.

MASSACHUSETTS—4.

Mount Hope Iron Company, Somerset. 100 nail machines.
Robinson Iron Company, Plymouth. 18 nail machines.
Tremont Nail Company, West Wareham. 173 nail machines.
Wareham Nail Company, South Wareham. 35 nail machines.

NEW JERSEY—3.

Boonton Iron Works, Boonton. 20 nail machines. (Patterson & Anthony are lessees of nail factory.)
Cumberland Nail and Iron Company, Bridgeton. 90 nail machines.
Oxford Iron and Nail Company, Oxford. 103 nail machines.

PENNSYLVANIA—EASTERN DISTRICT—5.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. 118 nail machines.
Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown. 105 nail machines.
Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. 41 nail machines.
Plymouth Rolling Mill, Conshohocken. 12 nail machines. Idle.
Pottstown Iron Company, Pottstown. 95 nail machines.

PENNSYLVANIA—CENTRAL DISTRICT—18.

Bellefonte Iron and Nail Company, Bellefonte. 53 nail machines.
Bradford County Nail Works, Wm. H. Godcharles, Towanda, Bradford county. 31 nail machines.
Chesapeake Nail Works, Charles L. Bailey & Co., Harrisburg. 103 nail machines.
Dalmatia Nail and Iron Company, Dalmatia. 20 nail machines. Nails made from purchased plate. Buildings erected for a rolling mill.
Danville Nail Works, Danville Nail and Manufacturing Company, Danville. 92 nail machines.
Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 64 nail machines.
Harrisburg Nail Works, Harrisburg. Works at Fairview, Cumberland county. 83 nail machines.

- Hollidaysburg Iron and Nail Company, Hollidaysburg. 23 nail machines.
- Juniata Rolling Mill, McLanahan, Smith & Co. Limited, Hollidaysburg. 30 nail machines.
- Lewisburg Rolling Mill, Wm. C. Frick, Danville. Works at Lewisburg. 41 nail machines. Nail department idle.
- Lock Haven Nail Company, Lock Haven. 20 nail machines.
- Milton Nail Works, The C. A. Godcharles Company, Milton. 100 nail machines.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 53 nail machines.
- Portage Iron Company Limited, Duncansville. 37 nail machines.
- Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury. 41 nail machines.
- Taggarts & Howell, Northumberland. 95 nail machines.
- Watsonstown Nail Works, Watsonstown. 25 nail machines.
- Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. 61 nail machines.

PENNSYLVANIA—WESTERN DISTRICT—8.

- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. 63 nail machines.
- Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. 96 nail machines.
- Atlantic Iron and Nail Works, P. L. Kimberly & Co., Sharon. 40 nail machines.
- Clinton Rolling Mill, Clinton Iron and Steel Company, Pittsburgh. 42 nail machines. Nail department idle.
- Etna Iron Works Limited, New Castle, Lawrence county. 55 nail machines.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. 92 nail machines.
- Sharon Iron Company, Sharon. 64 nail machines.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Works at Sharpsburg. 50 nail machines.

VIRGINIA—2.

- Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. 100 nail machines.
- Virginia Nail and Iron Works Company, Lynchburg. Works at Reusens, Campbell county. 46 nail machines.

WEST VIRGINIA—5.

- Belmont Nail Company, Wheeling. 152 nail machines.
- Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. 173 nail machines.

La Belle Iron Works, Wheeling. 143 nail machines.
 Riverside Iron Works, Wheeling. 224 nail machines.
 Top Mill, Wheeling Iron and Nail Company, Wheeling. 130 nail machines.

KENTUCKY—1.

Norton Iron Works, Ashland. 126 nail machines.

TENNESSEE—2.

Knoxville Iron Company, Knoxville. 41 nail machines.
 South Tredegar Iron Company, Chattanooga. 74 nail machines.

ALABAMA—1 COMPLETED AND 1 BUILDING.

Alabama Iron and Steel Company, Brierfield. 72 nail machines.
 Fort Payne Rolling Mill Company, Fort Payne, DeKalb county. Building, to contain 100 nail machines.

OHIO—13.

Belfont Iron Works Company, Ironton. 126 nail machines.
 Bellaire Nail Works, Bellaire. 125 nail machines.
 Falcon Iron and Nail Works, Falcon Iron and Nail Company, Niles. 44 nail machines.
 Jefferson Iron Works, Steubenville. 160 nail machines.
 Junction Iron Company, Mingo Junction. Branch office, Wheeling, W. Va. 126 nail machines.
 Kelly (The) Nail and Iron Company, Ironton. 119 nail machines.
 Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county. 192 nail machines.
 Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. 50 nail machines.
 Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown. 55 nail machines.
 Middleport Steel and Nail Works, King, Gilbert & Warner, Columbus. Works at Middleport, Meigs county. 102 nail machines.
 Spaulding Iron Company, Brilliant, Jefferson county. 78 nail machines.
 Wellston Steel and Nail Mill, F. E. Hinckley, Chicago, Ill. Works at Wellston, Jackson county. 130 nail machines.
 Whitely Steel Company, Springfield. 2 nail machines.

INDIANA—4.

East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county. 101 nail machines.
 Greenfield Iron and Nail Works, Greenfield, Hancock county. 50 nail machines.
 Muncie Nail Company, Muncie, Delaware county. 50 nail machines.
 Terre Haute Iron and Nail Works, Terre Haute. 144 nail machines.

ILLINOIS—5.

Belleville Steel and Iron Nail Works, Belleville Crescent Nail Company, lessee, Belleville. 60 nail machines.
Calumet Iron and Steel Company, Rookery Building, Chicago. Works at Cummings, Cook county. 132 nail machines.
Centralia Iron and Nail Works, Centralia. 52 nail machines.
Waugh Steel Works, Belleville. 76 nail machines.
Western Nail Company, Belleville. 154 nail machines.

WISCONSIN—1.

Milwaukee Works, Illinois Steel Company, Rookery Building, Chicago. Works at Bay View, Milwaukee. 100 nail machines.

MISSOURI—1.

Union Steel and Iron Company, St. Joseph. 50 nail machines.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo. 27 nail machines.

CALIFORNIA—1.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Works at Oakland, Alameda county. 96 nail machines.

UNITED STATES.

Total number of rolling mills containing cut-nail machines: 75 completed, and one building. Number of nail machines: 6,066.

In addition to the works enumerated above, all of which roll their own nail plate or intend soon to do so, there are a few small works in the country making nails from purchased plate, among which are the following:

Bush, (Lewis,) South Chicago, Illinois. Started a small nail works in 1885.

Cleveland Nail Works, T. D. Graham, 106 Canal st., Cleveland, Ohio. Began in 1886 to make small fine nails and barrel nails.

Excelsior Tack Works, P. Richards & Son, Nicetown, Philadelphia, Pa. Built in 1876 to make tacks; began to make nails in 1886; have 23 machines; product, all varieties of fine nails and tacks.

Globe Tack Works, Norristown, Pennsylvania. Fine nails and tacks.

Lewis, E. M., Anniston, Alabama. Fine nails and tacks.

Tiffin Nail Company, Tiffin, Ohio. Built in 1888; number of nail machines, 33; annual capacity, 20,000 kegs of cut nails.

OPEN-HEARTH STEEL WORKS.

NOTE.—These works are fully described in the list of rolling mills and steel works. The ton here used is the ton of 2,240 pounds. The works which make steel castings exclusively are so described; the others make plates, sheets, bars, billets, and forgings; a few works occasionally make a small quantity of rails.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. One 10-ton Siemens furnace.

MASSACHUSETTS—2.

Washburn and Moen Manufacturing Company, Worcester. One 12-ton Siemens furnace.

Worcester Steel Works, P. O. Box 967, Worcester. One 12-ton Siemens furnace.

NEW YORK—2.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. One 8-ton open-hearth furnace. Product, steel castings.

Ramel-Conley Iron and Steel Company, 290 Broadway, New York. Works at Brewster, Putnam county. One 10-ton open-hearth furnace.

NEW JERSEY—1 COMPLETED AND 1 BUILDING.

Newark Steel Works, Benjamin Atha & Co., Newark. One 7-ton Siemens furnace.

Passaic Rolling Mills, Passaic Rolling Mill Company, Paterson. Building two 20-ton open-hearth furnaces, to be in operation in January, 1890.

PENNSYLVANIA—EASTERN DISTRICT—7.

Bethlehem (The) Iron Company, South Bethlehem. Two completed Siemens furnaces (one 10-ton and one 20-ton) and two 30-ton Siemens furnaces building. Two 15-ton Siemens-Pernot furnaces standing in an advanced stage of construction.

Chester Rolling Mills, Thurlow, Delaware county. Two 15-ton Siemens furnaces.

Midvale Steel Company, Nicetown, Philadelphia. One 10-ton and two 15-ton Siemens furnaces.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works near Manayunk. Two 15-ton Siemens furnaces.

Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville. Two 15-ton Siemens furnaces.

Pottstown Iron Company, Pottstown, Montgomery county. One 12-ton Siemens furnace.

Standard Steel Casting Company, Thurlow, Delaware county. One 15-ton Siemens and one 20-ton Lash furnace. Product, steel castings.

PENNSYLVANIA—CENTRAL DISTRICT—2.

North Branch Steel Company, Danville. Office, 330 Walnut st., Philadelphia. One 15-ton Siemens furnace.

Pennsylvania Steel Company, Steelton. Office, 208 South Fourth st., Philadelphia. Two 30-ton Siemens furnaces.

PENNSYLVANIA—WESTERN DISTRICT—22 COMPLETED AND 2 BUILDING.

Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Two 15-ton Siemens furnaces.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. This firm prefers not to give a description of its works.

Cambria Iron and Steel Works, Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 20-ton Siemens-Pernot furnaces and one 12-ton Krupp washer which can be used as an open-hearth furnace by changing the bottom.

Carbon Iron Company, Thirty-second and Smallman sts., Pittsburgh. Two 15-ton Lash open-hearth furnaces. Building two 30-ton Lash furnaces.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Two 12-ton and two 20-ton Siemens furnaces. Product, open-hearth steel castings exclusively. Use no miscellaneous steel scrap of any kind.

Homestead Steel Works, Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Works at Munhall Station. One 15-ton, four 20-ton, and two 35-ton Siemens furnaces. Building eight additional 15-ton furnaces.

Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. One 35-ton Siemens furnace. Building an additional furnace.

Johnson Company, Johnstown, Cambria county. One 2-ton Lash furnace. Product, miter ingots and castings.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 12-ton Siemens furnaces.

La Belle Steel Works, Smith Brothers & Co., Pittsburgh. Two 15-ton Siemens furnaces.

Latrobe Steel Works, Latrobe, Westmoreland county. Branch office, 251 South Fourth st., Philadelphia. Two 20-ton Siemens furnaces.

Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg. Branch office, Iron Exchange Building, Pittsburgh. One 10-ton open-hearth furnace.

Linden Steel Company Limited, general office and works, Linden station, Second avenue, Pittsburgh, B. & O. R. R. Down-town office,

Lewis Block. One 10-ton, one 15-ton, and one 25-ton Siemens furnace.

McKeesport Iron Works, W. Dewees Wood Company, McKeesport, Allegheny county. Branch office, 111 Water st., Pittsburgh. Building two 15-ton Lash open-hearth furnaces.

Millvale Rolling Mill, Millvale Iron Company Limited, lessee, Pittsburgh. Two 15-ton Siemens furnaces.

National Tube Works Company, McKeesport, Allegheny county. One 18-ton Siemens furnace.

Pennsylvania Iron and Steel Works, W. J. Hammond & Sons, Pittsburgh. One 15-ton Siemens furnace. Idle.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. Works at Chartiers, Allegheny county. One 20-ton Siemens furnace.

Sharon Steel Casting Company, Sharon, Mercer county. One 5-ton and one 15-ton Siemens furnace. Product, steel castings.

Singer, Nimick & Co. Limited, Pittsburgh. One 10-ton Siemens furnace.

Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Two 15-ton Siemens furnaces.

Solar Iron and Steel Works, William Clark's Son & Co., Pittsburgh. Building two open-hearth furnaces.

Spang Steel and Iron Company Limited, Pittsburgh. Works at Etna. Three 10-ton Siemens furnaces.

West Penn Steel Works, Jennings Brothers & Co. Limited, Safe Deposit Building, Pittsburgh. Works at Leechburg, Armstrong county. One 10-ton Siemens furnace.

VIRGINIA—1 BUILDING.

Iron Gate Iron and Steel Company, Iron Gate, Alleghany county. Building one 15-ton basic open-hearth furnace.

KENTUCKY—1.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. One 7-ton Siemens furnace.

TENNESSEE—1.

Roane Iron Company, Chattanooga. Two 10-ton Siemens furnaces.

ALABAMA—1 BUILDING.

Henderson Steel and Manufacturing Company, Birmingham. Building one 20-ton basic open-hearth furnace.

OHIO—11.

Burgess Steel and Iron Works, Portsmouth. One 8-ton and one 10-ton Siemens furnace.

Canton Steel Works, Bolton Iron and Steel Company, Canton. General

- office, Twenty-first and Liberty sts., Pittsburgh, Pa. Two 10-ton Siemens furnaces.
- Cleveland Rolling Mill Company, Cleveland. Three 7-ton and two 15-ton Siemens furnaces.
- Columbus Steel Company, Charles Parrott, Receiver, Columbus. Two 15-ton Siemens furnaces. Idle.
- Kellogg (The) Seamless Tube and Manufacturing Company, Findlay. Office, 40 Water st., Boston. One 10-ton open-hearth furnace. Building one 25-ton furnace.
- Otis (The) Steel Company Limited, Cleveland. Seven 15-ton Siemens furnaces.
- Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth. One 10-ton Siemens furnace. Idle.
- Solid Steel Company, Alliance, Stark county. One 5-ton and one 10-ton open-hearth furnace. Product, steel castings.
- Whitely Steel Company, Springfield, Clark county. One 8-ton open-hearth furnace. Building one additional 8-ton open-hearth furnace.
- Youngstown Steel Company, Youngstown. One 20-ton Siemens furnace, and one 10-ton Pernot furnace for dephosphorizing metal by the Krupp-Bell process.
- Zanesville Iron Works, Ohio Iron Company, Zanesville. One 10-ton furnace.

INDIANA—2.

- Ætna Iron and Steel Works, 161 La Salle st., Chicago. Works at Crown Point. One small open-hearth furnace. Product, castings.
- Indianapolis Rolling Mill Company, Indianapolis. Two 15-ton Siemens furnaces.

ILLINOIS—3.

- Calumet Iron and Steel Company, Rookery Building, Chicago. Works at Cummings, Cook county. Four 4-ton Siemens furnaces.
- Chicago Crucible Steel Casting Company, Elston and Webster avenues, Chicago. Office, 156 Lake st. One 5-ton open-hearth furnace. Product, castings and ingots.
- Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. Two 20-ton Siemens-Pernot furnaces and one Pernot furnace for dephosphorizing pig metal.

CALIFORNIA—1.

- Pacific Rolling Mill Company, 202 Market st., P. O. Box 2,032, San Francisco. One 5-ton and one 18-ton Siemens furnace.

UNITED STATES.

Total number of open-hearth steel works in the United States: 56 completed, and 5 building. Number of furnaces: 116 completed, and 23 building.

BESSEMER STEEL WORKS.

NOTE.—Under this head are included all works that produce steel by the method of blowing air into or through molten iron, including the ordinary acid Bessemer process, the basic Bessemer process, the Clapp-Griffiths process, and the Robert-Bessemer process. The ton used in giving the capacity of the converters is the ton of 2,240 pounds. For a full description of these works see the list of rolling mills and steel works. The names of the mills which make a specialty of rolling standard sections of steel rails are printed in SMALL CAPITALS.

ORDINARY BESSEMER PROCESS.

MASSACHUSETTS—2.

American Steel Car-wheel Company, 4 Post-office Square, Boston. Works, corner First and I sts., South Boston. One 1-ton and one 3-ton converter. Made first blow in January, 1889.

WORCESTER STEEL WORKS, P. O. Box 967, Worcester. Two 4-ton converters. Made first blow June 2, 1884.

NEW YORK—I.

TROY STEEL AND IRON COMPANY, Troy. Two 10-ton converters. Made first blow February 16, 1865.

PENNSYLVANIA—17.

ALLEGHENY BESSEMER STEEL COMPANY, Duquesne. Two 6-ton converters. Made first blow in February, 1889.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Two 7-ton converters. Made first blow August 19, 1886.

BETHLEHEM (THE) IRON COMPANY, South Bethlehem. Four 7-ton converters. Made first blow October 4, 1873.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Two small converters. Made first blow September 21, 1885.

CAMBRIA IRON AND STEEL WORKS, CAMBRIA IRON COMPANY, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 9-ton and two 11½-ton converters. Made first blow July 10, 1871.

Chester Rolling Mills, Thurlow, Delaware county. Two 3-ton converters. Made first blow in fall of 1889.

Columbia Iron and Steel Company, 132 First ave., Pittsburgh. Works at Uniontown. Two 5-ton converters. Made first blow September 1, 1887.

Crescent Steel Works, Crescent Steel Company, 136 First ave., Pittsburgh. Two 2-ton converters.

EDGAR THOMSON STEEL WORKS, CARNEGIE BROTHERS & Co, LIMITED, Bessemer Station, Allegheny county. Branch office and post office address, 48 Fifth avenue, Pittsburgh. Four 10-ton converters. Made first blow August 25, 1875.

Hainsworth Steel Company, Pittsburgh. One 5-ton converter. Made first blow August 26, 1881.

Homestead Steel Works, Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Works at Munhall Station. Two 5-ton converters. Made first blow March 19, 1881.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. One 6-ton converter. Made first blow March 15, 1886. Propose adding an additional 6-ton converter.

LACKAWANNA IRON AND STEEL WORKS, LACKAWANNA IRON AND COAL COMPANY, Scranton. Two 7-ton converters. Made first blow October 23, 1875. Preparing to erect an additional 7-ton converter.

NORTH BRANCH STEEL COMPANY, Danville. Office, 330 Walnut st., Philadelphia. Two 4-ton converters.

PENNSYLVANIA STEEL WORKS, PENNSYLVANIA STEEL COMPANY, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Two 7-ton and three 8-ton converters. Made first blow in June, 1867.

Pottstown Iron Company, Pottstown. Three 10-ton converters. Made first blow July 1, 1886. Has also used the basic process.

SCRANTON (THE) STEEL COMPANY, Scranton. Two 6-ton converters. Made first blow March 29, 1883.

VIRGINIA—1.

Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. Two 3-ton converters. Made first blow October 10, 1887.

WEST VIRGINIA—2.

Riverside Iron Works, Wheeling. Two 5-ton converters. Made first blow June 11, 1884.

Wheeling Steel Works, Wheeling. Works at Benwood, Marshall county. Two 5-ton converters. Made first blow August 12, 1886.

TENNESSEE—2.

ROANE IRON COMPANY, Chattanooga. One 5-ton converter. Made first blow May 7, 1887.

South Tredegar Iron Company, Chattanooga. One 2-ton converter. Made first blow April 19, 1886.

OHIO—6.

Bellaire Nail Works, Bellaire, Belmont county. Two 5-ton converters. Made first blow April 28, 1884.

- CLEVELAND ROLLING MILL COMPANY, Cleveland. Two 10-ton converters. Made first blow October 15, 1868.
- Jefferson Iron Works, Steubenville, Jefferson county. Two 3-ton converters. Made first blow March 12, 1887.
- Laughlin and Junction Steel Company, Wheeling, W. Va. Works at Mingo Junction, Jefferson county. Two 5-ton converters. Made first blow February 8, 1886.
- Middleport Steel and Nail Works, King, Gilbert & Warner, Columbus. Works at Middleport, Meigs county. Two 3-ton converters, built in 1887.
- Otis (The) Steel Company Limited, Cleveland. Two 5-ton converters. Made first blow August 5, 1884.

INDIANA—1.

- East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county. Two 3-ton converters. Made first blow November 22, 1887.

ILLINOIS—7.

- Centralia Iron and Nail Works, Centralia, Marion county. One 2-ton converter. Made first blow March 29, 1888. Idle.
- ILLINOIS STEEL COMPANY, Rookery Building, Chicago. Four separate works in Illinois. NORTH WORKS at Chicago, Cook county; two 6-ton converters; made first blow April 10, 1872. SOUTH WORKS at South Chicago, Cook county; three 10-ton converters; made first blow June 14, 1882. JOLIET WORKS at Joliet, Will county; two 8-ton converters; made first blow January 26, 1873. UNION WORKS at Chicago, Cook county; two 10-ton converters; made first blow July 26, 1871.
- SPRINGFIELD IRON COMPANY'S IRON AND STEEL WORKS, SPRINGFIELD IRON COMPANY, Springfield. Two 5-ton converters. Made first blow September 8, 1887.
- Waugh Steel Works, Belleville, St. Clair county. Two 4-ton converters. Made first blow August 6, 1887.

MISSOURI—1.

- ST. LOUIS ORE AND STEEL COMPANY, Granite Building, St. Louis. Two 7-ton converters. Made first blow September 1, 1876.

COLORADO—1.

- COLORADO COAL AND IRON COMPANY, Pueblo. New York office, Mills Building. Two 5-ton converters. Made first blow April 11, 1882.

UNITED STATES.

Total number of ordinary Bessemer steel works: 41. Number of converters: 88.

CLAPP-GRIFFITHS PROCESS.

MASSACHUSETTS—1.

Tremont Nail Company, West Wareham, Plymouth county. One 3-ton converter. Made first blow in December, 1887.

PENNSYLVANIA—6.

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown, Montgomery county. Two 3-ton converters. Made first blow May 11, 1886.

Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. Two 3-ton converters. Made first blow September 5, 1887.

McCormick & Co., Harrisburg, Dauphin county. One 3-ton converter. Made an experimental blow April 27, 1886. Idle.

Oliver Iron and Steel Company, Pittsburgh. Two 2-ton converters. Made first blow March 25, 1884.

Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two 3-ton converters. Made first blow February 2, 1886.

Spang Steel and Iron Company Limited, Pittsburgh. Works at Etna. Two 3-ton converters. Made first blow March 1, 1887.

ILLINOIS—1.

Western Nail Company, Belleville, St. Clair county. Two 3-ton converters. Made first blow January 21, 1886.

UNITED STATES.

Total number of Clapp-Griffiths steel works: 8. Number of converters: 14.

ROBERT-BESSEMER PROCESS.

PENNSYLVANIA—3.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Two 1½-ton converters. Made first blow in November, 1889.

Crane Iron Company, Catasauqua, Lehigh county. Office, 224 South Fourth st., Philadelphia. One 1½-ton converter, built in 1889.

Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. One 1½-ton and one 5-ton converter, built in 1889. Made first blow September 24, 1889.

OHIO—1.

Bookwalter Casting Company, Springfield, Clark county. Two 1½-ton converters, built in 1888-9. Made first blow in September, 1888.

INDIANA—1.

Chicago Horse Shoe Company, Rookery Building, Chicago, Ill. Works at East Chicago, Lake county. One 1½-ton converter. Made first blow October 20, 1889.

ILLINOIS—1.

Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. One 2-ton converter. Made first blow September 5, 1889. Building an additional 2-ton converter.

MICHIGAN—1.

Michigan Steel Works, Detroit. Two 2-ton converters. Made first blow July 11, 1889.

MISSOURI—1 BUILDING.

Union Steel and Iron Company, St. Joseph. Building two 2-ton converters.

UNITED STATES.

Total number of Robert-Bessemer steel works: 7 completed, and one building. Number of converters: 11 completed, and 3 building.

PROJECTED.

East Chicago Foundry Company, East Chicago, Indiana, contemplates erecting two Robert-Bessemer converters.

Kibler Stove Company, Denver, Colorado, contemplates erecting one Robert-Bessemer converter, for making stove castings.

CRUCIBLE STEEL WORKS.

NOTE.—These steel works are fully described in the list of rolling mills and steel works. Their capacity is here indicated by the number of pots which each works can use at one heat. Unless otherwise indicated their product is merchant steel.

MASSACHUSETTS—1.

Washburn Car-wheel Company, Hartford, Conn. Steel Works at Worcester. 48 pots. Product used exclusively for car-wheel tires.

CONNECTICUT—3.

Collins Company, Collinsville, Hartford county. 180 pots. Product used in the manufacture of edge tools.

Farist (The) Steel Company, Bridgeport. 96 pots.

Windsor Locks Steel Company, Bridgeport. Works at Windsor Locks. 40 pots.

NEW YORK—5.

Chrome Steel Works, Kent avenue and Keap st., Brooklyn. 54 pots.
Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. 20 pots.
Product, steel castings.
Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown. 96 pots. Product used in making saws.
Sanderson Brothers Steel Company, Syracuse. 64 pots.
Syracuse Steel Foundry Company, Syracuse. 32 pots. Product, castings.

NEW JERSEY—7.

Harvey Steel Company, Brills Station, Newark. 8 pots.
Heller & Brothers, Newark. 48 pots. Product used in making tools.
Jersey City Steel Works, Benjamin Atha & Co., lessees, Newark.
Works at Jersey City. 320 pots.
New Jersey Steel Works, John Illingworth & Co., (incorporated,) Harrison, Hudson county. 30 pots.
Newark Steel Works, Benjamin Atha & Co., Newark. 60 pots.
Pompton Steel and Iron Company, Pompton, Passaic county. 160 pots.
West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City. 96 pots.

PENNSYLVANIA—20 COMPLETED AND 2 BUILDING.

Beaver Falls Steel Works, Beaver Falls, Beaver county. 24 pots.
Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh.
This firm prefers not to give a description of its works for publication.
Carpenter Steel Company, Reading, Berks county. Main office, Bo-reel Building, New York. Building, to contain 96 pots.
Crescent Steel Works, Crescent Steel Company, 136 First avenue, Pittsburgh. 180 pots.
Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. 36 pots.
Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. 24 pots.
Frankford Steel Company, Frankford, Philadelphia. 40 pots.
Greensburg Steel Company, Greensburg, Westmoreland county. Building, to contain 24 pots.
Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. 204 pots.
Hussey, Binns & Co. Limited, Pittsburgh. 24 pots. Product used in making shovels and scoops.
Johnson Company, Johnstown, Cambria county. 48 pots. Product, mitis castings.
Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. 102 pots. Product used in making saws, etc.

La Belle Steel Works, Smith Brothers & Co., Pittsburgh. 120 pots.
 Midvale Steel Company, Nicetown, Philadelphia. 48 pots.
 Nellis's Agricultural Works, Pittsburgh. 20 pots. Idle.
 Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. 48 pots.
 Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. 90 pots. Product, steel castings.
 Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. Works at Chartiers. 66 pots.
 Reliance Steel Casting Company Limited, Pittsburgh. 18 pots. Product, steel castings.
 Singer, Nimick & Co. Limited, Pittsburgh. 258 pots.
 Sterling Steel Company, 208 Wood st., Pittsburgh. Works at Demmler. 48 pots.
 Wayne Iron and Steel Works, Brown & Co., Pittsburgh. 162 pots.

MARYLAND—1.

Crown and Cumberland Steel Company, 413 Commerce st., Philadelphia. Works at Cumberland. 24 pots.

VIRGINIA—1 BUILDING.

Iron Gate Iron and Steel Company, Iron Gate, Alleghany county. Building, to contain 30 pots.

TENNESSEE—1.

Southern (The) Steel Works, Chattanooga. 20 pots.

OHIO—1.

Burgess Steel and Iron Works, Portsmouth, Scioto county. 24 pots.

INDIANA—2.

Ætna Iron and Steel Works, 161 La Salle st., Chicago. Works at Crown Point. 4 pots. Product, steel castings.
 Schulte, Lohoff & Co., Evansville. 30 pots. Product, steel castings.

ILLINOIS—1.

Chicago Crucible Steel Casting Company, Elston and Webster avenues, Chicago. Office, 156 Lake st. 30 pots.

MICHIGAN—1.

Detroit Steel and Spring Works, Michigan and Hubbard avenues, Detroit. 30 pots.

UNITED STATES.

Total number of crucible steel works in the United States: 43 completed, and 3 building. Number of pots in completed works, 3,378.

WIRE-NAIL WORKS.

NOTE.—Very few of these works draw the wire which they use, but in some cases they roll rods and draw wire also. The works which roll rods are fully described in the list of rolling mills.

MASSACHUSETTS—10.

American Tack Company, Fairhaven. Number of nail machines, 25.
Clark & Dow, Haverhill.

Dunbar, Hobart & Co., Whitman. Number of nail machines, 28. Annual capacity, 2,400 kegs, mostly small nails.

Field (A.) & Sons, Taunton.

Gurney, (D. B.), Whitman.

Perkins Brothers, Bridgewater. Number of nail machines, 15.

Phillips (E.) & Sons, South Hanover.

Taunton Tack Company, Taunton.

Trufant, (W. E.), Whitman.

Wire (The) Goods Company, Worcester. Number of nail machines, 100.

RHODE ISLAND—1.

American Screw Company, Providence. Draw wire and make wire nails.

CONNECTICUT—1.

Russell and Erwin Manufacturing Company, New Britain. Office, 45 Chambers st., New York City.

NEW YORK—4.

Brooklyn Wire Nail Company, 17 Broadway, New York City. Draw wire and make wire nails. Number of nail machines, 60. Annual capacity, 130,000 kegs.

Griswold Brothers, Troy. Draw wire and make wire nails. Number of nail machines, 18. Annual capacity, 18,000 kegs.

Hassall, (John,) 63 and 65 Elizabeth st., New York City. Number of nail machines, 50.

Hoag & Titchener, Binghamton. Number of nail machines, 4.

PENNSYLVANIA—7.

Beaver Falls Mills, Carnegie, Phipps & Co. Limited, Beaver Falls. Office, 48 Fifth ave., Pittsburgh. Roll rods, draw wire, and make wire nails.

- Excelsior Tack Works, P. Richards & Son, Nicetown, Philadelphia.
 Number of nail machines, 3.
 Meadville Wire Nail Company, Meadville.
 New Castle Wire Nail Company, New Castle. Draw wire and make wire nails. Number of nail machines, 65. Annual capacity, 400,000 kegs.
 Pennsylvania Tack Works, Norristown.
 Philips, Townsend & Co., North Penn Junction, Philadelphia. Draw wire and make wire nails. Number of nail machines, 70. Annual capacity, 150,000 kegs.
 Pittsburgh Wire Nail Company, Pittsburgh. Number of nail machines, 74. Annual capacity, 250,000 kegs.

KENTUCKY—1.

- American (The) Wire Nail Company, Covington. Roll rods, draw wire, and make wire nails. Number of nail machines, 80. Annual capacity, 250,000 kegs. Contemplates moving plant to Anderson, Ind., where the rod mill is located.

OHIO—5.

- Cincinnati (The) Wire Company, Cincinnati. Number of wire-nail machines, 75.
 H. P. Nail Company, Cleveland. Roll rods, draw wire, and make wire nails. Number of nail machines, 190. Annual capacity, 550,000 kegs.
 Salem Wire Nail Company, Salem. Works at Salem and at Findlay. Salem works, 83 nail machines; annual capacity, 400,000 kegs. Findlay works, 50 nail machines; annual capacity, 200,000 kegs.
 United States Wire Nail Works, Jackson. Draw wire and make wire nails. Number of nail machines, 60. Annual capacity, 300,000 kegs.

ILLINOIS—3.

- Chicago Wire Nail Company, Chicago.
 Illinois Wire Nail Company, Chicago.
 Lenz Wire Nail Company, Belleville. Number of nail machines, 14.

MICHIGAN—1.

- McCamly (The) and Taylor Nail Company Limited, Battle Creek.
 Daily capacity, single turn, 200 kegs.

MISSOURI—1.

- St. Louis Wire Mill Company, St. Louis. Draw wire and make wire nails. Number of nail machines, 54. Annual capacity, 275,000 kegs.

IOWA—1.

- McCosh Iron and Steel Company, Burlington. Draw wire and make wire nails.

NEBRASKA—1.

Omaha Barb Fence and Nail Company, Omaha. Number of nail machines, 8.

CALIFORNIA—1.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Works at Oakland. Draw wire and make wire nails. Number of nail machines, 22.

UNITED STATES.

Total number of wire-nail works in the United States: 37.

WIRE-ROD AND WIRE MILLS.

NOTE.—Those works which do not draw wire but which roll rods are indicated by the word "rods" placed after their names; all others draw wire. For a more complete description of the rod mills see the list of rolling mills. Some of the wire works in this list make copper and brass wire as well as iron and steel wire.

MAINE—1.

Eastern Wire Works, Harrison.

MASSACHUSETTS—9.

Cambridge Rolling Mills, Gilmore & Eustis, Cambridgeport. Rods. Annual capacity, 3,000 tons.

Lamb (Horace) & Co., Northampton.

Palmer Wire Manufacturing Company, Palmer.

Prentiss (G. W.) & Co., Holyoke.

Prouty Wire Company, Charlton City. Annual capacity, 150 tons of wire.

Spencer Wire Company, Spencer.

Washburn and Moen Manufacturing Company, Worcester. Two mills. Rods and wire.

Worcester Wire Company, Worcester.

RHODE ISLAND—1.

American Screw Company, Providence.

CONNECTICUT—4.

Ansonia Brass and Copper Company, Ansonia.

Gilbert and Bennett Manufacturing Company, Georgetown. Annual capacity, 1,800 tons of wire.

New Haven Rolling Mill, New Haven Rolling Mill Company, New Haven. Rods.

New Haven Wire Company, New Haven.

NEW YORK—8.

Brooklyn Wire Nail Company, 17 Broadway, New York City.

Carey & Moen, 234 West 29th st., New York City.

Griswold Brothers, Troy.

Syracuse Iron Works, Syracuse. Rods. Idle.

Troy Steel and Iron Company, Troy. Rods.

Westerman Rolling Mill, Westerman & Co., Lockport. Rods.

Wickwire Brothers, Cortland.

Wolff (R. H.) & Co. Limited, 117th and 118th sts. and Harlem River, New York City.

NEW JERSEY—3.

John A. Roebling's Sons Company, Trenton. Rods and wire.

New Jersey Steel and Iron Company, Trenton. Rods.

Trenton Iron Company, Trenton. Rods and wire.

PENNSYLVANIA—12.

Beaver Fall Mills, Carnegie, Phipps & Co. Limited, 48 Fifth ave., Pittsburgh. Works at Beaver Falls. Rods and wire.

Braddock Wire Company, Pittsburgh. Rods and wire.

Cambria Iron Company, Johnstown. Rods. Annual capacity, 30,000 tons.

Gautier Steel Department of Cambria Iron Company, Johnstown. Rods and wire. Idle.

Hazard Manufacturing Company, Wilkesbarre. Draw wire for own use in the manufacture of wire rope.

Iowa Barb Wire Company, Allentown. Rods and wire.

Lehigh and Franklin Wire Mills, Stewart & Co., Easton.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Rods and wire.

New Castle Steel Company, New Castle. Rods.

Oliver and Roberts Wire Company Limited, Pittsburgh. Rods and wire.

Philadelphia Wire Works, Thomas Hamilton's Sons, 1340 Vienna st., Philadelphia.

Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. Rods.

OHIO—6.

American Wire Company, Cleveland. Rods and wire.

Belmer (H.) & Co., Cincinnati.

Cleveland Rolling Mill Company, Cleveland. Rods and wire.

Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus. Rods.

H. P. Nail Company, Cleveland. Rods and wire.

United States Wire Nail Works, Jackson.

INDIANA—1.

American (The) Wire Nail Company, Covington, Kentucky. Works at Anderson. Annual capacity, 38,000 tons. Rods and wire.

ILLINOIS—6.

Ashley Wire Company, Joliet.

Baker Wire Company, Lockport.

Chicago Wire and Spring Company, Chicago. Works at Lockport.

Illinois Steel Company, Rookery Building, Chicago. Rods and wire.

Illinois Wire Company, East St. Louis.

Lambert and Bishop Wire Fence Company, Joliet.

MISSOURI—1.

St. Louis Wire Mill Company, St. Louis.

IOWA—1.

McCosh Iron and Steel Company, Burlington.

CALIFORNIA—2.

California Wire Works, 332 Bay st., San Francisco. Annual capacity, 10,000 tons of wire.

Pacific Iron and Nail Company, 9 Beale st., San Francisco.

UNITED STATES.

Total number of wire-rod and wire mills in the United States: 55.

CARBUILDERS.

NOTE.—Those companies or firms which make street cars only are so mentioned; those which make both railroad cars and street cars are indicated by the word "both" after their addresses; all others make railroad cars only. This list does not include railroad companies which build cars.

MAINE—1.

Portland Company, Portland. Annual capacity, 500 freight cars.

NEW HAMPSHIRE—1.

Laconia Car Company, Laconia. Annual capacity, 600 freight and 30 passenger cars.

MASSACHUSETTS—6.

Bradley Car Works, Osgood Bradley & Sons, Worcester.

Ellis Car Company, Amesbury. Street cars only.

Keith Manufacturing Company, Hyannis.

Keith Manufacturing Company, Sagamore.

Newburyport Car Manufacturing Company, Newburyport. Street cars only.

Wason Manufacturing Company, Springfield. Daily capacity, one passenger and 6 freight cars.

NEW JERSEY—1.

McEwen, (A. C.) Jersey City.

NEW YORK—10.

Buffalo Car Manufacturing Company, Buffalo.

Feigel Car Company, New Utrecht, Long Island. Both.

Gilbert Car Manufacturing Company, Troy and Schenectady.

Jones's (J. M.) Sons, Agents, West Troy. Street cars only.

Lewis and Fowler Manufacturing Company, Brooklyn. Street cars only.

Pioneer Iron Works, Brooklyn.

Ryan & McDonald, Waterloo. Annual capacity, 2,500 narrow gauge cars of all kinds.

Stephenson (The John) Company Limited, New York City. Street cars only. Annual capacity, 600.

Turl (John) & Sons Iron Works, New York City.

Wagner Palace Car Company, Buffalo and Schenectady.

PENNSYLVANIA—26.

- Allison Manufacturing Company, Philadelphia.
Altoona Car Works, Altoona.
Billmeyer and Small Company, York.
Bloomsburg Car Company, Bloomsburg. Annual capacity, 2,500 freight cars.
Carlisle Manufacturing Company, Carlisle.
Connellsville Machine and Car Works, Connellsville.
Dauphin Car Works, Dauphin. Annual capacity, 2,500 gondola cars.
Empire Car Works, Schall & King, York. Annual capacity, 1,500 freight cars.
Erie Car Works Limited, Erie. Daily capacity, 20 freight cars.
Glen Rock Manufacturing Company, Glen Rock.
Harman & Hassert, Bloomsburg.
Harrisburg Car Manufacturing Company, Harrisburg. Annual capacity, 4,000.
Hazleton Iron Works, Allison, John & Co., Hazleton.
Hockensmith & Wagoner, Irwin. Mine cars.
Huntingdon Car and Car Wheel Works, Huntingdon Manufacturing Company, Huntingdon. Annual capacity, 2,500 freight cars.
Jackson (The) and Woodin Manufacturing Company, Berwick.
Lebanon Manufacturing Company, Lebanon. Annual capacity, 3,000 freight cars.
Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Daily capacity, 20 freight cars.
Lehigh Valley Car Company, Stemton. Annual capacity, 2,000 freight cars.
Middletown Car Works, Schall & King, Middletown. Annual capacity, 2,500 freight cars.
Milton Car Works, Murray, Dougal & Co. Limited, Milton. Annual capacity, 3,500 freight cars.
Morris (W.) & Brother, Hazleton.
Pardee Car and Machine Works, Pardee, Snyder & Co. Limited, Watertown.
Pennsylvania Car Works, Latrobe.
Philadelphia Car Works, J. G. Brill Company, Philadelphia. Both. Annual capacity, 100 passenger, 500 freight, and 700 street cars.
Steele (J. D.) and Son Manufacturing Company, Pottstown.

DELAWARE—3.

- Delaware Car Works, Jackson and Sharp Company, Wilmington. Annual capacity, 400 passenger, sleeping, and parlor cars.
Harlan (The) and Hollingsworth Company, Wilmington.
Pullman's Palace Car Company, Wilmington. Both.

MARYLAND—1.

South Baltimore Car Works, Baltimore.

VIRGINIA—2.

Roanoke Machine Works, Roanoke. Annual capacity, 3,500 freight cars.

Tredegear Company, Richmond.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Annual capacity, 4,500 freight cars.

TENNESSEE—3.

Chattanooga Car and Foundry Company, H. Clay Evans, proprietor, Chattanooga.

Southern Car Works, Knoxville.

Tennessee Coal, Iron, and Railroad Company, South Pittsburg.

NORTH CAROLINA—1.

North Carolina Car Company, Raleigh. Annual capacity, 300 freight cars.

GEORGIA—1.

Atlanta Machine Works, Atlanta.

ALABAMA—3.

Alabama Car and Foundry Company, Anniston. Annual capacity, 3,000 freight cars.

Elliott (The) Car Company, Gadsden.

United States Rolling Stock Company, Decatur.

TEXAS—1.

Tyler Car and Lumber Company, Tyler.

OHIO—8.

Barney and Smith Manufacturing Company, Dayton.

Kuhlmann Car Company, Cleveland. Street cars only.

Lima Shops, Lafayette Car Works, Lima. Main office, Lafayette, Ind.

Annual capacity, 3,600 freight cars. *See Indiana.*

Minerva Car Works, Pennock Brothers, Minerva. Annual capacity, 2,000 freight cars.

O'Ferrell (John) & Co., Piqua.

United States Rolling Stock Company, Urbana.

Watt (J. H.) & Brothers, Barnesville.

Youngstown Car Manufacturing Company, Youngstown.

INDIANA—6.

Haskell and Barker Car Company, Michigan City.

Indianapolis Car and Manufacturing Company, Indianapolis.

Lafayette Car Works, Lafayette. Annual capacity, 4,500 freight cars.

See Lima Shops, Ohio.

Missouri Car and Foundry Company, Cambridge City. Annual capacity, 2,400.

Ohio Falls Car Company, Jeffersonville. Annual capacity, 6,000 freight and 300 passenger cars. Will soon commence building street cars.

Terre Haute Car and Manufacturing Company, Terre Haute. Both. Annual capacity, 4,000.

ILLINOIS—5.

Corey Car and Manufacturing Company, 14 Chicago. Both.

Litchfield Car and Machine Company, Litchfield. Annual capacity, 4,500.

Pullman's Palace Car Company, Pullman. Both.

United States Rolling Stock Company, Hegewisch. Annual capacity, 6,000 freight and 150 passenger cars.

Wells, French & Co., Chicago.

MICHIGAN—6.

Iron Bay Foundry, Marquette. Mine and tram cars only.

Michigan Car Company, Detroit. Annual capacity, 10,000 freight cars.

Muskegon Car Company, Muskegon.

Peninsular Car Company, Detroit. Annual capacity, 9,000 freight cars.

Pullman's Palace Car Company, Detroit. Both.

Wallen, (H. D.) Jr., Grand Rapids.

MINNESOTA—2.

Minnesota Iron Car Company, Duluth. Annual capacity, 4,500 freight cars.

Robinson & Moan Car Company, Minneapolis. Street cars only.

MISSOURI—7.

Brownell and Wight Car Company, St. Louis. Street cars only. Annual capacity, 600.

Kansas City Car and Wheel Company, Kansas City. Daily capacity, 10 freight cars.

Laclede Car Manufacturing Company, St. Louis. Street cars only. Daily capacity, 10.

Missouri Car and Foundry Company, St. Louis. Annual capacity, 8,000 freight cars.

St. Charles Car Company, St. Charles. Both. Annual capacity, 5,000 freight, 150 passenger, and 250 street cars.

St. Joseph Steel Car Company, St. Joseph.

St. Louis Car Company, St. Louis. Street cars only.

KANSAS—1.

Burton Stock Car Company, Wichita. Office, 194 Washington st., Boston, Mass. Daily capacity, 16.

CALIFORNIA—3.

California Car Works, J. Hammond & Co., San Francisco. Both. Annual capacity, 1,500 freight, 300 passenger, and 360 street cars. Specialty, cable cars.

Holt Brothers, Stockton. Both.

Newark Car Works, Carter Brothers, San Francisco. Both. Annual capacity, 500 freight, 50 passenger, and 100 street cars.

UNITED STATES.

Total number of carbuilders in the United States: 99.

CAR-WHEEL WORKS.

NOTE.—The following list does not include railroad companies which make car wheels.

MAINE—1.

Portland Company, Portland. Product, cast iron wheels. Annual capacity, 7,500.

NEW HAMPSHIRE—3.

Ford & Kimball, Concord. Product, cast iron wheels.

Laconia Car Company, Laconia. Product, cast iron wheels.

Nashua Iron and Steel Company, Nashua. Product, hardened steel-tired wheels.

VERMONT.—2.

Miltimore Elastic Steel Car Wheel Company, Arlington. Product, steel wheels. Daily capacity, 25.

St. Albans Foundry, St. Albans. Product, cast iron wheels. Annual capacity, 10,000.

MASSACHUSETTS—6.

American Steel Car Wheel Company, 4 Post-office Square, Boston. Works at South Boston. Product, all-steel car wheels. Annual capacity, 30,000.

Boston Standard Wheel Company, Boston. Product, cast iron wheels.
Bradley Car Works, Osgood Bradley & Sons, Worcester.

- Heartt (Jonas S.) & Co., Troy, N. Y. Works at Allston, Mass. Product, cast iron wheels. Annual capacity, 25,000.
Mason Machine Works, Taunton. Product, cast iron wheels.
Wason Manufacturing Company, Springfield. Product, cast iron wheels. Annual capacity, 20,000.

CONNECTICUT—2.

- Barnum Richardson Company, Lime Rock. Product, chilled iron wheels. Annual capacity, 25,000.
Washburn Car-wheel Company, Hartford. Product, crucible-steel-tired wheels. Annual capacity, 5,000.

NEW YORK—13.

- Albany Car Wheel Works, Albany. Product, cast iron wheels.
Allen Paper Car Wheel Company, 31 Broadway, New York. Works at Hudson. Product, steel-tired wheels, paper centres. Annual capacity, 12,000.
Andrews, (Frank H.), 535 West 33d st., New York City. Product, cast iron wheels.
Atwood Hemp Car Wheel Company, New York City.
Brooks Locomotive Works, Dunkirk. Product, Thurber steel wheels.
Buffalo Car Wheel Works, Buffalo. Product, cast iron wheels.
Heartt (Jonas S.) & Co., Troy. Product, cast iron wheels.
New York Car Wheel Works, Buffalo. Product, cast iron wheels. Annual capacity, 70,000.
Peckham Street Car Wheel and Axle Company, 239 Broadway, New York. Product, street car wheels.
Ramapo Wheel and Foundry Company, Ramapo. Product, cast chilled iron wheels and steel-tired wheels. Annual capacity, 60,000 cast iron and 12,000 steel-tired.
Rochester Car Wheel Works, Rochester. Product, cast iron wheels. Annual capacity, 70,000.
Rood and Brown, East Buffalo. Product, cast iron wheels. Annual capacity, 70,000.
Thacher (Geo. H.) & Co., Albany. Product, cast iron wheels.

NEW JERSEY—5.

- Jersey City Wheel Foundry and Machine Works, Jersey City. Product, cast iron wheels and Thomas steel-tired wheels. Annual capacity, 30,000.
Taylor Iron Works, High Bridge. Product, chilled iron and steel-tired wheels. Annual capacity, 40,000 cast iron and 5,000 steel tired.
Thompson, (L. P.), Bordentown. Product, cast iron wheels.
Washburn Cast Steel Car Wheel Company, Raritan. Product, cast steel wheels.

Washburn (The) Hunts Company, Jersey City. Product, cast iron wheels. Annual capacity, 25,000.

PENNSYLVANIA—18.

Boies Steel Car Wheel Works, Boies Steel Wheel Company, Scranton. Product, steel-tired wheels, with radially corrugated steel centres. Annual capacity, 7,500.

Connellsville Machine and Car Works, Connellsville. Product, cast iron pit-car wheels. Annual capacity, 20,000.

Davenport & Fairbairn, Erie. Product, cast iron wheels. Annual capacity, 110,000.

Freas Manufacturing Company, Berwick.

Hainsworth Steel Company, Pittsburgh. Product, rolled steel wheels.

Harman & Hassert, Bloomsburg. Product, cast iron wheels.

Harrisburg Car Manufacturing Company, Harrisburg. Product, cast iron wheels. Annual capacity, 36,000.

Hazleton Iron Works, Allison, John & Co., Hazleton. Product, cast iron wheels. Daily capacity, 50.

Hockensmith & Wagoner, Irwin. Product, mine-car wheels. Weekly capacity, 500.

Hodge Manufacturing Company Limited, Greenville. Product, cast iron wheels.

Huntingdon Car and Car Wheel Works, Huntingdon Manufacturing Company, Huntingdon. Product, cast iron wheels.

Jackson (The) and Woodin Manufacturing Company, Berwick. Product, cast iron wheels. Annual capacity, 70,000.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Product, cast iron wheels and steel-tired wheels. Daily capacity, 300.

Marshall, (John,) Kittanning. Product, mine-car wheels.

Pennsylvania Rolled Steel Car Wheel Company, Norristown. Preparing to manufacture rolled steel car wheels.

Redstone Foundry, Uniontown. Product, cast iron wheels.

Sax, (J. K.,) Pittston. Product, cast iron wheels.

Sayre Steam Forge, Cayuta Wheel and Foundry Company, Sayre. Product, cast iron wheels. Annual capacity, 100,000.

Whitney (A.) & Sons, Callowhill and Sixteenth sts., Philadelphia. Product, steel-tired and chilled cast iron wheels. Daily capacity, 80 tons.

DELAWARE—1.

South Side Foundry, Lobdell Car-wheel Company, Wilmington. Product, chilled iron wheels. Annual capacity, 150,000.

MARYLAND—1.

Baltimore Car Wheel Company, Fulton Junction, Baltimore. Product, chilled wheels. Daily capacity, 400.

VIRGINIA—2.

Atlantic Iron Works, W. A. Anderson, Norfolk. Product, cast iron wheels. Annual capacity, 200 to 300.

Tredegar Iron Works, Tredegar Company, Richmond. Product, cast iron wheels. Annual capacity, 30,000.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Product, cast iron chilled wheels. Annual capacity, 90,000.

KENTUCKY—1.

Louisville Car Wheel and Railway Supply Company, Louisville. Product, cast iron wheels.

TENNESSEE—2.

Chattanooga Car and Foundry Company, H. Clay Evans, proprietor, Chattanooga. Product, cast iron wheels. Daily capacity, 80 tons.

Knoxville Car-wheel Company, Knoxville. Product, cast iron wheels.

ALABAMA—4.

Alabama Car and Foundry Company, Anniston.

Decatur Car Wheel and Manufacturing Company, New Decatur. Product, cast iron wheels. Daily capacity, 120.

Peacock Iron Works, George Peacock, Selma. Product, automatic self-oiling tram wheels. Annual capacity, 35,000.

United States Rolling Stock Company, Anniston.

TEXAS—2.

Dickson Car Wheel Company, Houston. Product, cast iron wheels. Annual capacity, 25,000.

Marshall Car Wheel and Foundry Company, Marshall. Product, cast iron wheels. Annual capacity, 50,000.

OHIO—12.

Barney and Smith Manufacturing Company, Dayton. Product, cast iron wheels. Annual capacity, 45,000.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Product, self-oiling chilled mine-car wheels. Annual capacity, 15,000.

Cleveland Foundry, Bowler & Co., Cleveland. Product, chilled and steel-tired wheels. Annual capacity, 100,000.

Cleveland Wheel and Foundry Works, Maher & Brayton, Cleveland. Product, cast iron wheels.

Fulton Foundry Company, Cleveland. Product, chilled iron wheels.

Lima Machine Works, Lima. Product, cast iron and steel-tired wheels. Annual capacity, 1,500 tons.

- Lima Shops, Lafayette Car Works, Lima. Main office, Lafayette, Ind. Product, cast iron wheels. Annual capacity, 45,000. *See Indiana.*
- Mowry Car Wheel Works, Cincinnati. Product, cast iron wheels.
- Nelsonville Foundry and Machine Company, Nelsonville. Product, cast iron mine-car wheels.
- Paige Car Wheel Company, 211 Superior st., Cleveland. Product, steel-tired plate and spoke wheels. Annual capacity, 10,000.
- Paige Hardware Manufacturing Company, Akron.
- Watt (The) Mining Car Wheel Company, Barnesville. Product, self-oiling chilled mine-car wheels. Annual capacity, 35,000.

INDIANA—8.

- Bass Foundry and Machine Works, Fort Wayne. Product, cast iron wheels.
- Haskell and Barker Car Company, Michigan City. Product, cast iron wheels.
- Indianapolis Car and Manufacturing Company, Indianapolis. Product, cast iron wheels.
- Lafayette Car Works, Lafayette. Product, cast iron wheels. Annual capacity, 45,000. *See Lima Shops, Ohio.*
- Ohio Falls Car Company, Jeffersonville. Product, cast iron wheels. Annual capacity, 75,000.
- Steadman & Co., Aurora. Product, cast iron wheels.
- Terre Haute Car and Manufacturing Company, Terre Haute. Product, cast iron wheels. Annual capacity, 35,000.
- Treat (C. A.) Manufacturing Company, East Chicago. Office, Hannibal, Missouri. Product, cast iron wheels. Annual capacity, 40,000.

ILLINOIS—9.

- Allen Paper Car Wheel Company, Chicago. Works at Pullman, Cook county. Product, paper wheels.
- Barnum Richardson Manufacturing Company, Chicago.
- Bass, (J. H.), Chicago. Product, cast iron wheels.
- Bouton & Co., Chicago. Works at Aurora. Product, cast iron wheels. Annual capacity, 36,000.
- Chicago Car Wheel Company, Chicago. Product, cast chilled iron and steel-tired wheels. Annual capacity, 40,000.
- Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Product, rolled steel car wheels. Annual capacity, 75,000.
- Griffin Wheel and Foundry Company, Chicago. Product, cast iron wheels. Annual capacity, 100,000.
- Litchfield Car and Machine Company, Litchfield. Product, cast iron wheels. Annual capacity, 37,000.
- Union Foundry and Pullman Car Wheel Works, Pullman. Product, cast iron wheels. Annual capacity, 100,000.

MICHIGAN—7.

- Butterworth & Lowe, Grand Rapids. Product, cast iron wheels. Annual capacity, 9,000.
Detroit Car Wheel Works, Detroit. Product, cast iron wheels.
Griffin Car Wheel Company, Detroit. Product, cast iron wheels. Annual capacity, 75,000.
Iron Bay Foundry, Marquette.
Michigan Car Company, Detroit.
Peninsular Car Company, Detroit. Product, chilled cast iron wheels. Annual capacity, 85,000.
Russel Wheel and Foundry Company, Detroit. Product, cast iron wheels. Annual capacity, 14,000.

WISCONSIN—1.

- Milwaukee Car Wheel and Foundry Company, Milwaukee. Product, Barr contracting chilled cast iron wheels. Annual capacity, 50,000.

MINNESOTA—3.

- Minnesota Iron Car Company, Duluth. Annual capacity, 30,000.
Northwestern Foundry, Menzel & Ferguson, Minneapolis. Product, cast iron wheels. Annual capacity, 6,000.
St. Paul Foundry Company, St. Paul. Product, cast iron wheels. Annual capacity, 10,000.

MISSOURI—6.

- Green's Car Wheel Manufacturing Company, St. Louis. Product, cast iron wheels.
Kansas City Car and Wheel Company, Kansas City.
Missouri Car and Foundry Company, St. Louis. Product, cast chilled charcoal iron wheels. Annual capacity, 150,000.
St. Charles Car Company, St. Charles. Product, cast iron wheels. Annual capacity, 36,000.
St. Louis Car Wheel Company, St. Louis. Product, cast iron wheels.
Treat (C. A.) Manufacturing Company, Hannibal. Product, cast iron wheels. Annual capacity, 25,000.

CALIFORNIA—2.

- Risdon Iron and Locomotive Works, San Francisco. Product, cast iron wheels.
Steiger & Kerr, 137 First st., San Francisco. Product, cast iron wheels.

WASHINGTON—1.

- Tacoma Car Wheel Works, Tacoma.

UNITED STATES.

Total number of car-wheel works in the United States: 113.

CAR-AXLE WORKS.

NOTE.—The following list does not include railroad companies which make car axles. The annual capacity in axles is printed in all cases where manufacturers have furnished this information.

MAINE—1.

Eastern Forge Company, Portland.

NEW HAMPSHIRE—2.

Cole Manufacturing Company, Lake Village. Annual capacity, 5,000.

Nashua Iron and Steel Company, Nashua. Annual capacity, 12,000.

MASSACHUSETTS—4.

Boston Forge Company, Boston. Annual capacity, 12,000.

Bradley Car Works, Osgood Bradley & Sons, Worcester.

Cape Ann Anchor Works, Gloucester.

Talcott (N. W.) Axle Works, S. & W. C. Lawton, Brightwood. Annual capacity, 6,000.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence.

CONNECTICUT—1.

Bridgeport Forge Company, Bridgeport.

NEW YORK—7.

Central Forge Works, Whitestone Landing, Long Island.

DeLaney Forge and Iron Company, Buffalo.

Gould's (C. A.) Buffalo Steam Forge, 24 Hayen Building, Buffalo.

Peckham Street Car Wheel and Axle Company, 239 Broadway, N. Y.

Sizer (W. S.) Steam Forge, Buffalo.

Troy Steel and Iron Company, Troy. Annual capacity, 15,000.

Wood, (William W.) Wood's Falls.

NEW JERSEY—3.

Paterson Iron Company, Paterson.

Taylor Iron Works, High Bridge. Annual capacity, 36,000.

Union Steam Forge, Macpherson, Willard & Co., Bordentown.

PENNSYLVANIA—23.

Allentown (The) Rolling Mills, Allentown.

Anchor Brand Axle Works, Sheldon Axle Company, Wilkesbarre.

Bethlehem (The) Iron Company, South Bethlehem.

Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Annual capacity, 50,000.

Carnegie, Phipps & Co. Limited, Pittsburgh. Annual capacity, 55,000.

Catasauqua Manufacturing Company, Catasauqua. Annual capacity, 15,000.

Cayuta Wheel and Foundry Company, Sayre. Annual capacity, 5,000.

Dickson Manufacturing Company, Scranton.

Erie Forge Company Limited, Erie.

Frankford Steel Co., Frankford, Philadelphia. Annual capacity, 10,000.

Green Ridge Iron Works, A. L. Spencer, Scranton.

Jackson (The) and Woodin Manufacturing Company, Berwick.

Lackawanna Iron and Coal Company, Scranton. Mine car axles only.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Daily capacity, 80.

Lewisburg Steam Forge Company, Lewisburg.

Midvale Steel Company, Nicetown, Philadelphia. Annual capacity, 20,000.

Milton Iron Company, Milton.

Montour Iron and Steel Company, Danville.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Annual capacity, 42,000.

Penn Iron Company Limited, Lancaster.

Pittsburgh Forge and Iron Company, Pittsburgh. Capacity, 80,000.

Vulcan Forge and Iron Works, Long & Co., Pittsburgh.

Ward Axle, Brake, and Coupling Company, Monongahela City.

DELAWARE—1.

Johnson Forge Company, Wilmington. Annual capacity, 35,000.

MARYLAND—1.

Crown and Cumberland Steel Company, 413 Commerce st., Philadelphia. Works at Cumberland.

VIRGINIA—2.

Richmond Steam Forge, J. R. Johnson & Co., Richmond. Annual capacity, 40,000.

Tredegar Iron Works, Tredegar Company, Richmond. Annual capacity, 2,400 net tons.

WEST VIRGINIA—2.

Ensign (The) Manufacturing Company, Huntington. Annual capacity, 15,000.

Standard Axle Manufacturing Company, Wheeling.

KENTUCKY—1.

Louisville Steam Forge Company, Louisville.

ALABAMA—1.

United States Rolling Stock Company, Anniston. Annual capacity, 12,000 net tons.

OHIO—5.

Akron Steam Forge Company, Akron.

Cincinnati Forge and Iron Company, Cincinnati. Capacity, 30,000.

Cleveland City Forge and Iron Company, Cleveland. Capacity, 110,000.

Lake Erie Iron Company, Cleveland. Annual capacity, 42,000.

Otis (The) Steel Company Limited, Cleveland.

INDIANA—4.

Bass Foundry and Machine Works, Fort Wayne.

Central Iron and Steel Company, Brazil. Annual capacity, 20,000.

National Forge and Iron Company, East Chicago. Chicago office, 557 South State st.

New Albany Forge and Rolling Mill, New Albany. Annual capacity, 40,000.

ILLINOIS—3.

Chicago Forge and Bolt Company, Rookery Building, Chicago.

Pullman's Palace Car Company, Pullman.

Willard Sons & Bell Company, Chicago.

MICHIGAN—2.

Baugh Steam Forge Company, Detroit.

Michigan Car Company, Detroit.

WISCONSIN—1.

De Pere Steam Forge, West De Pere.

MINNESOTA—1.

Minnesota Iron Car Company, Duluth.

MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis. Annual capacity, 30,000.

St. Louis Steam Forge and Rolling Mills, G. C. McDonald, St. Louis. Annual capacity, 50,000.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo.

CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco. Annual capacity, 4,000.

UNITED STATES.

Total number of car-axle works in the United States: 70.

WROUGHT-IRON PIPE WORKS.

MASSACHUSETTS—1.

Tyler Steel Tube Company, 131 Devonshire st., Boston. Product, locomotive tubes; annual capacity, 9,000 tons.

NEW YORK—2.

Cohoes Tube Works, Curtis & Co., Cohoes. Annual capacity, 12,000 tons.

Syracuse Tube Company, Syracuse. Annual capacity, 25,000 tons.

NEW JERSEY—2.

Cumberland Nail and Iron Company, Bridgeton.

Spiral Weld Tube Company, 5 and 7 Beekman st., New York. Works at East Orange.

PENNSYLVANIA—16.

Allison Manufacturing Company, Philadelphia.

American Tube and Iron Company, Middletown. Office, 98 John st., New York. Annual capacity, 125,000 tons.

Byers (A. M.) & Co., Pittsburgh.

Chester Pipe and Tube Company, Chester. Office, 216 South Fourth st., Philadelphia.

Conshohocken Tube Company, Conshohocken. Annual capacity, 10,000 tons.

Continental Tube Company, Pittsburgh.

Duquesne Tube Works Company, 99 Water st., Pittsburgh. Annual capacity, 15,000 tons.

Etna Iron Works, Spang, Chalfant & Co., Pittsburgh.

Lehigh Tube and Coil Works, Albright's Son & Co., Allentown.

National Tube Works Company, McKeesport. Annual capacity, 250,000 tons.

Norristown Iron Works, James Hooven, Norristown.

Oil City Tube Company, Oil City. Annual capacity, 30,000 tons.

Paschal Iron Works, Morris, Tasker & Co., (incorporated,) 222 South Third st., Philadelphia.

Pennsylvania Tube Works, Pittsburgh. Annual capacity, 50,000 tons.

Pittsburgh (The) Tube Company, Pittsburgh. Annual capacity, 50,000 tons.

Reading Iron Company, Reading. Annual capacity, 50,000 tons.

WEST VIRGINIA—1.

Riverside Iron Works, Wheeling. Annual capacity, 30,000 tons.

OHIO—3.

American Tube and Iron Company, Youngstown. Office, 98 John st., New York. Annual capacity, 25,000 tons.
Kellogg (The) Seamless Tube and Manufacturing Company, Findlay.
Paige Tube Company, Warren.

ILLINOIS—2.

Crane Brothers Manufacturing Company, 10 North Jefferson st., Chicago.
Haxtun Steam Heater Company, Kewanee.

CALIFORNIA—1.

Risdon Iron and Locomotive Works, San Francisco.

UNITED STATES.

Total number of wrought-iron pipe works in the United States: 28.

CAST-IRON PIPE WORKS.

NEW YORK—1.

Buffalo Cast Iron Pipe Company, 344 Exchange st., Buffalo.

NEW JERSEY—6.

Gloucester Iron Works, Gloucester City. Office, 6 North Seventh st., Philadelphia.
McNeal (The) Pipe and Foundry Company, Burlington.
Warren Foundry and Machine Company, Phillipsburg. Sales office, 160 Broadway, New York.
Wood (R. D.) & Co., Millville, Camden, and Florence. Three works. Office, 400 Chestnut st., Philadelphia.

PENNSYLVANIA—10.

Allison, (L. S.) Hazleton and Minersville. Two works.
Carbon Iron and Pipe Company Limited, Mauch Chunk. Works at Parryville.
Emaus Pipe Foundry, Donaldson Iron Company, Emaus. Main office, 226 Walnut st., Philadelphia.
Fisher Pipe Manufacturing Company, Allentown.
Jackson (The) and Woodin Manufacturing Company, Berwick.
Mellert Foundry and Machine Company Limited, Reading.
National Foundry and Pipe Works Limited, Scottdale.
Reading Foundry Company Limited, Reading.
Sayre Pipe Foundry Company, Sayre.

VIRGINIA—2.

Hill City Pipe Works, Glamorgan Company, Lynchburg.
Tredegar Iron Works, Tredegar Company, Richmond.

KENTUCKY—2.

Addyston (The) Pipe and Steel Company, Cincinnati, Ohio. Works at
Newport. *See Ohio.*
Dennis Long & Company, Louisville.

TENNESSEE—2.

Chattanooga Foundry and Pipe Works, Chattanooga.
South Pittsburg Pipe Works, South Pittsburg. Expect soon to increase
capacity.

ALABAMA—2.

Anniston Pipe Works, Anniston.
Birmingham Iron Works, Birmingham.

TEXAS—1.

Rusk Penitentiary, State of Texas, W. G. Parish, Financial Agent,
Rusk, Cherokee county.

OHIO—4.

Addyston (The) Pipe and Steel Company, Cincinnati. Works at Ad-
dyston. *See Kentucky.*
Cleveland Pipe Works Company, New Philadelphia.
Lake Shore Foundry, Cleveland.
Ohio (The) Pipe Company, Columbus.

MICHIGAN—1.

Detroit Pipe and Foundry Company, Detroit.

WISCONSIN—1.

West Superior Iron and Steel Company, West Superior.

MISSOURI—1.

Shickle, Harrison, and Howard Iron Company, St. Louis.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo.

OREGON—1.

Oregon Iron and Steel Company, Oswego. Main office, 106 Third st.,
Portland.

UNITED STATES.

Total number of cast-iron pipe works in the United States : 35.

LOCOMOTIVE WORKS.

NOTE.—The following list does not include railroad companies which make locomotives.

MAINE—1.

Portland Locomotive Works, Portland. Annual capacity, 72.

NEW HAMPSHIRE—1.

Manchester Locomotive Works, Manchester. Annual capacity, 144.

MASSACHUSETTS—2.

Mason (The) Machine Works, Taunton. Annual capacity, 72.

Taunton Locomotive Manufacturing Company, Taunton. Annual capacity, 96.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence. Annual capacity, 240.

NEW YORK—3.

Brooks Locomotive Works, Dunkirk. Annual capacity, 200.

New York Locomotive Works, Rome. Annual capacity, 125.

Schenectady Locomotive Works, Schenectady. Annual capacity, 300.

NEW JERSEY—3.

Cooke Locomotive and Machine Company, Paterson. Annual capacity, 180.

Grant Locomotive Works, Paterson. Annual capacity, 125.

Rogers Locomotive and Machine Works, Paterson. Annual capacity, 300.

PENNSYLVANIA—6.

Baldwin Locomotive Works, Burnham, Parry, Williams & Co., Philadelphia. Annual capacity, 800.

Dickson Manufacturing Company, Scranton. Annual capacity, 100.

Hazleton Iron Works, Allison, John & Co., Hazleton. Light and mine locomotives.

Pittsburgh Locomotive and Car Works, Pittsburgh. Annual capacity, 130.

Improvements being made that will increase annual capacity to 250.

Porter (H. K.) & Co., Pittsburgh. Light locomotives. Annual capacity, 150.

Vulcan Iron Works, Wilkesbarre. Light locomotives. Annual capacity, 40.

MARYLAND—1.

Mt. Savage Locomotive Works, Mt. Savage. Annual capacity, 50.

VIRGINIA—3.

Richmond (The) Locomotive and Machine Works, Richmond. Annual capacity, 100.

Roanoke Machine Works, Roanoke. Annual capacity, 25.

Virginia Iron Works, Godwin (T. W.) & Co., Norfolk. Light locomotives.

OHIO—2.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Light locomotives.

Lima Machine Works, Lima. Light weight and Shay patent locomotives. Annual capacity, 72.

CALIFORNIA—1.

Risdon Iron and Locomotive Works, San Francisco. Not building locomotives at present.

WASHINGTON—1.

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ADDENDA.

NOTE.—The greater part of the information given below comprises changes in existing works which have been made since the first part of the Directory was printed and descriptions of new enterprises which were not decided upon until after that portion of the book was printed in which they belong.

BLAST FURNACES.

- Cold Spring Furnace has been bought in under foreclosure proceedings and is now offered for sale. Trustees, E. M. Cook, 115 Broadway, New York, and J. Wesley Pullman, 238 South Third st., Philadelphia. (Page 3.)
- Macungie Furnace has been leased by the Crane Iron Company, and is producing Bessemer pig iron. (Page 12.)
- On November 28, 1889, the Thomas Iron Company gave up the lease of Lucy Furnace, which is owned by the Lucy Furnace Company, and the stack is now being operated by the Bethlehem Iron Company. (Page 12.)
- Edge Hill Furnace has been leased by W. R. Hart & Co., 402 Walnut st., Philadelphia, who have made arrangements for its operation by the Crane Iron Company. (Page 13.)
- J. Lansing Mines has resigned the office of Secretary and Treasurer of the Lucinda Furnace Company. (Page 14.)
- John S. Kennedy has been appointed superintendent of Everett Furnace. (Page 22.)
- The Glamorgan Iron Company made an assignment in December, 1889, to Charles Gilpin, Jr. R. W. McCredy is now Secretary and Treasurer of the company. Temporary office with The Allentown Rolling Mills, 237 South Third st., Philadelphia. (Page 22.)
- Clinton Furnace is to be rebuilt to 72½ x 14½. (Page 26.)
- Edward P. Parrott, of New York City, has been appointed Receiver of the Cameron Iron and Coal Company, of Emporium, Pa. (Page 28.)
- The Catoctin charcoal stack built in 1775 should be considered as abandoned. (Page 32.)
- A coke furnace is projected at Max Meadows, Wythe county, Va.
- The new furnaces at Graham and Roanoke are now being built. Walter Graham is Manager of the Graham Furnace. (Page 37.)
- James P. Witherow is now building two coke furnaces at Middlesborough, Ky., for the Middlesborough Iron, Steel, and Coal Company. The stacks will be 75 x 17, equipped with eight 20 x 60 Whitwell

stoves. Officers: Edmund Hannay Watts, President, London, Eng.; George L. Reis, General Manager, Frank Watts, Secretary, and Edgar Watts, Treasurer, Middlesborough. Members of this company also contemplate the erection of a basic steel plant at Middlesborough. (Page 39.)

O. W. Davis, Jr., proposes to erect a charcoal furnace at Middlesborough, Ky., in 1890. (Page 39.)

A coke blast furnace, 75 x 17, is projected at Bristol, Tennessee, by the Bristol Iron and Steel Company.

The Rockdale Mining and Manufacturing Company has begun building a charcoal furnace at Rockdale, Maury county, Tennessee. Main office, Nashville. One stack, 55 x 11; 2 hot-blast stoves; will use local brown hematite ore; product to be foundry and car-wheel pig iron; annual capacity, 15,000 net tons. Lucius Frierson, President, and George W. Killebrew, Superintendent, Columbia; J. B. Killebrew, Vice-President, and Wm. S. Jones, Secretary and Treasurer, Nashville.

The Southern Iron Company is an Alabama corporation which has acquired possession of eight charcoal furnaces in Alabama and Tennessee, namely: The Aetna, Cumberland, La Grange, West Nashville, and Warner Nos. 1 and 2 in Tennessee, and the Attalla Furnace in Alabama. It is preparing to build a ninth furnace at Allen's Creek, Wayne county, Tenn. The company also owns the rolling mill and steel plant, but not the furnaces, of the Roane Iron Company. It expects to remodel these works and erect a basic open-hearth steel plant. Officers: Nathaniel Baxter, Jr., President; A. M. Shook, General Manager; W. E. McNeilly, Secretary and Treasurer. Office, Nashville, Tenn.

Bibb Furnace is to use charcoal as fuel in 1890. (Page 43.)

The Bessemer Iron and Steel Company and The Little Belle Iron Company have been merged in The De Bardeleben Coal and Iron Company, and the majority of the stock of the Eureka Company is controlled by the same corporation. The building of two more large furnaces is contemplated. (Pages 43 and 44.)

The W. B. Wood Furnace has been bought by a new organization, called the Florence Cotton and Iron Company, which will at once begin the erection of a complete modern stack, 75 x 17, on the foundation already built. Officers: Wm. A. Hudson, President, Florence, Ala.; John Dickey, Vice-President, Philadelphia; James Pollock, Secretary and Treasurer. Abraham S. Patterson, of Philadelphia, is Chairman of the Executive Committee. (Page 46.)

Decatur Charcoal Iron Furnace has been leased to the Decatur Iron, Land, and Lumber Company, New Decatur, Alabama. E. C. Gordon, President. Expects to start furnace in January, 1890. (Page 47.)

The Vanderbilt Steel and Iron Company will build its coke furnace

at East Birmingham, Alabama. The machinery is now being constructed under the supervision of Stein & Schwarz, of Philadelphia. The stack will be 65' x 14, equipped with three Massick & Crook stoves. Officers of the company: George O. Vanderbilt, President, Princeton, N. J.; Carl A. Meissner, Vice-President and Manager, P. O. Box 867, Birmingham, Ala.; C. F. Ackermann, Secretary and Treasurer, 27 Beaver st., New York. (Page 48.)

The Proton Furnaces have been leased by Pickands, Mather & Co., of Cleveland, Ohio, who will dismantle the old stack and rebuild the other, and start it on Bessemer pig iron early in 1890. (Page 57.)

The Illinois Steel Company has begun building four more blast furnaces at its South Works, each to be 85 x 21. (Page 58.)

ROLLING MILLS, STEEL WORKS, ETC.

The officers of the Reading Rolling Mill Company are as follows: Francis H. Saylor, President; Joseph H. Cofrode, Vice-President; J. E. Challenger, Secretary and Treasurer. (Page 105.)

The firm name of R. A. Bostley & Godcharles has been changed to Wm. H. Godcharles. (Page 107.)

The Hainsworth Steel Company is replacing its 5-ton Bessemer converter with two 6-ton vessels. H. D. Hibbard has been appointed Superintendent of the works. (Page 121.)

The W. Dewees Wood Company has commenced building an open-hearth steel plant of two 15-ton Lash furnaces. (Page 123.)

The Pittsburgh Steel Casting Company has begun the erection of a new Bessemer steel plant to consist of one 8-gross-ton converter, the necessary cupolas, and a 20-ton steam crane and smaller cranes. The product will be used exclusively for castings. The company expects to make all small castings of crucible steel and the larger ones up to 16,000 pounds of refined Bessemer steel. (Page 125.)

The Vulcan Forge and Iron Works of Long & Co. are in the hands of creditors. The personal property of the firm was sold in December, 1889. (Page 128.)

Martin Joyce's crucible steel plant, built at Connellsville, Pa., in 1889, and recently destroyed by fire, is expected to be rebuilt.

The Taylor Wire Nail Company has begun the erection of works at Emmens, a new town near Greensburg, Westmoreland county, Pa., for the manufacture of three-cornered wire nails.

The Burgess Steel and Iron Works (page 153) have bought the Portsmouth Iron and Steel Works (page 155) and will operate them.

The steel plant of the Indianapolis Rolling Mill Company has been leased by the New Albany Rail Mill Company. (Page 157.)

The address of the Norton Fluid Metal Rolling Company is care of Norton Brothers, 36-46 River st., Chicago. (Page 161.)

The Peoria Rolling Mill Company's plant will consist of 4 double pud-

dling furnaces, 7 heating furnaces, 6 trains of rolls, (two 8-inch, two 10-inch, and two 18-inch,) and one 2½-ton hammer; product to be hoops and merchant iron. Fuel, coal. C. P. King, President; H. C. Carrick, Vice-President; C. H. Mosher, Secretary; R. C. Flower, Treasurer; Thomas Gogin, Manager. (Page 161.)

Taylorsville, in Johnson county, Tennessee, frequently referred to in descriptions of the forges of that State, is now called Mountain City. Esherick, Cotton & Co., have removed their office from 263 South Fourth st., to 418 Walnut st., Philadelphia.

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