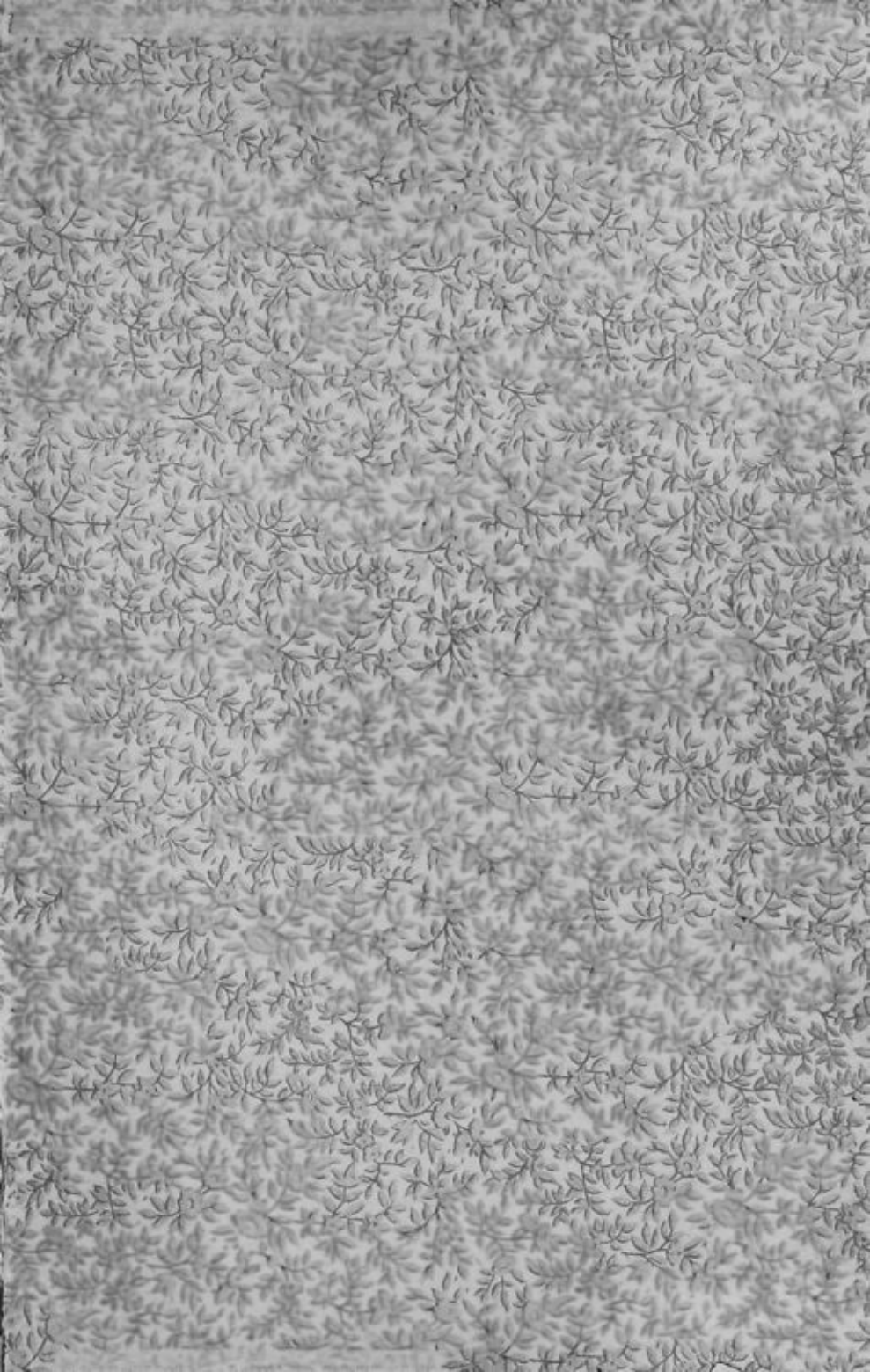

THE
IRON AND STEEL WORKS
OF
THE UNITED STATES,
ALSO OF CANADA AND MEXICO.

1892.

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Presented by
Mr D.C. Clapp.



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

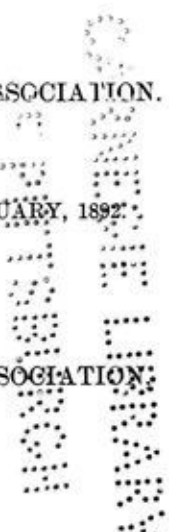
EMBRACING A FULL LIST OF THE BLAST FURNACES, ROLLING MILLS, STEEL WORKS, TINPLATE WORKS, AND FORGES AND BLOOMARIES IN THE UNITED STATES; ALSO OF ALL THE CUT-NAIL WORKS, ROD MILLS, WIRE-NAIL WORKS, WIRE MILLS, CAR-AXLE WORKS, CAR-WHEEL WORKS, CAR-BUILDERS, LOCOMOTIVE WORKS, CAST-IRON PIPE WORKS, AND WROUGHT-IRON PIPE WORKS.

TO WHICH IS ADDED A COMPLETE LIST OF THE IRON AND STEEL WORKS OF CANADA AND MEXICO.

COMPILED AND PUBLISHED
BY THE AMERICAN IRON AND STEEL ASSOCIATION.

ELEVENTH EDITION. CORRECTED TO FEBRUARY, 1892.

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Philadelphia.

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of Mr. D. C. Clark

PREFACE TO THE ELEVENTH EDITION.

IN presenting to the members of the American Iron and Steel Association another edition of our Directory to the Iron and Steel Works of the United States we desire, first, to acknowledge the cordial and generally prompt co-operation of all iron and steel manufacturers in supplying information for its pages, and, next, to explain to all who have supplied this information that its earlier publication has been rendered impossible by the necessity of taking extraordinary pains to verify all the details which it contains. Every precaution has been taken to avoid errors. Our greatest difficulty has been encountered in ascertaining the exact status of new enterprises which have been either undertaken or projected. A vast amount of labor has been expended in separating baseless claims from enterprises that have been undertaken in good faith. Much labor has also been expended upon several new features of the Directory, all of which, we feel sure, will commend themselves to general approval.

The old features of the Directory which are contained in the present edition embrace lists of the blast furnaces, rolling mills, Bessemer steel works, open-hearth steel works, crucible steel works, forges, bloomeries, cut-nail works, wire-rod and wire mills, wire-nail works, locomotive works, car works, car-axle works, car-wheel works, and cast and wrought iron pipe works in the United States. The entirely new features of the present edition embrace a complete list of the tinplate works established or undertaken in the United States since the passage of the McKinley tariff of October 1, 1890, and a complete list of existing iron and steel works in Canada and Mexico. Many of the old features have been enlarged to include fuller information, as, for instance, the list of wire-nail works and wire mills, which is now not only complete for the whole country but also embraces details concerning most of the works which we have not heretofore been able to obtain. The capacity of the locomotive works, car works, pipe works, and other industries which consume iron and steel on a large scale is also given in the present edition in fuller detail than ever before. The classified and alphabetical arrangement of former editions has been preserved in the present edition, and the table of contents and the indexes will be found to meet all reasonable expectations. The new edition contains 34 pages more information than the edition of 1890, which in turn embraced more printed pages than any of its predecessors.

The present edition brings down the description of our iron and steel works to the month of February, 1892. The new information which it contains covers the two calendar years 1890 and 1891. In the first of these years there was great activity in our iron and steel industries, our production of pig iron, rolled iron, and steel ingots in that year being greater than in any other year in our history. In the last of the two years mentioned there was a serious reaction in our iron and steel industries, as well as in most other manufacturing industries, and the production of pig iron and of some other leading products declined. Naturally there was more activity in 1890 in projecting and erecting new iron and steel works than in 1891, and naturally also many of the iron and steel enterprises which were undertaken in 1890 and immediately preceding years were abandoned in 1891 or encountered financial reverses. This is especially true of many Southern enterprises. It may also be said that, owing to the reaction mentioned, and to the fact that the building of blast furnaces had been pushed to the utmost limit of ordinary business prudence, very few absolutely new blast-furnace enterprises were undertaken in 1891. There was, however, considerable activity in that year in the building of new rolling mills and steel works in addition to the tinplate works which the McKinley tariff called into existence.

Blast Furnaces Built and Building.—In the edition of the Directory for 1890 we enumerated 575 blast furnaces as being active at the close of 1889 or likely to become active. In the present edition we describe 569 furnaces, or 6 furnaces less than at the close of 1889. The total of 569 furnaces is reached after noting the new furnaces which were completed during the last two years and eliminating the old furnaces which were wrecked or abandoned during the same period. The new furnaces number 52, of which 1 is anthracite, 35 are coke, and 16 are charcoal. The furnaces abandoned or torn down number 58, of which 22 were anthracite, 14 were coke, and 22 were charcoal. Of the 569 furnaces described in the present edition 164 use anthracite coal or mixed anthracite and coke; 267 use bituminous coal or coke; and 138 use charcoal.

The new furnaces which were completed in the two years mentioned include 1 charcoal furnace in Connecticut; 1 anthracite and 6 coke furnaces in Pennsylvania; 1 charcoal and 2 coke furnaces in Maryland; 1 charcoal and 6 coke furnaces in Virginia; 2 charcoal and 3 coke furnaces in Kentucky; 1 coke furnace in Tennessee; 1 charcoal furnace in Georgia; 2 charcoal and 7 coke furnaces in Alabama; 3 charcoal furnaces in Texas; 1 charcoal and 2 coke furnaces in Ohio; 6 coke furnaces in Illinois; 4 charcoal furnaces in Michigan; 1 coke furnace in Minnesota; and 1 coke furnace in Colorado. In all the other States

which have a blast-furnace industry no new furnaces were built in 1890 or 1891. In addition to the furnaces which were completed in these two years the building of 11 other furnaces has been undertaken and is now, at the beginning of 1892, in progress, namely, 6 coke furnaces in Virginia, 1 charcoal and 3 coke furnaces in Tennessee, and 1 coke furnace in North Carolina. All these are in Southern States. Not one new furnace is now in course of erection in any Northern State, although the foundations for a new furnace at Buffalo have been laid. In November, 1887, there were 30 furnaces in course of erection in the whole country, and in November, 1889, there were 27 furnaces.

Of the new furnaces which were built in 1890 and 1891 it is noticeable that 16 were charcoal furnaces, located in nine States, even New England rebuilding one abandoned furnace. The building of 3 of these furnaces in Texas emphasizes the fact that this State is now entitled to recognition as one of the promising iron-producing States of the Union. The building of 4 new charcoal furnaces in Michigan is an event which is also significant. This State is within such easy communication by railroad and water with great centres of pig-iron consumption, especially for foundry purposes, that, with its rich iron ores and still abundant supplies of accessible timber, no good reason exists why it should not continue to increase its annual production of charcoal pig iron.

There was a great decline in the building of new furnaces in Alabama in 1890 and 1891 as compared with the furnace-building activity which had prevailed in this State in immediately preceding years. At the close of 1887 there were 24 completed furnaces in Alabama and 19 were in course of erection; two years later there were 44 completed furnaces in this State and 8 were in course of erection, 20 furnaces having been completed in these two years. But in 1890 and 1891 only 9 furnaces were built in Alabama, 8 of which had previously been undertaken, while at the close of 1891 there was not one new furnace in this State in course of erection.

Far different has been the course of events in the last two years in Virginia. From the close of 1887 to the close of 1889 this State built only 2 furnaces and abandoned 3, the whole number decreasing from 33 to 32, with 2 new furnaces under construction. But in 1890 and 1891 Virginia built 7 new furnaces, and at the close of the latter year it had 6 additional furnaces in course of erection. Its progress in the building and projection of new furnaces in the last two years was greater than that of any other State, Alabama coming next. After Virginia and Alabama the Southern State which has manifested the most activity in furnace building in 1890 and 1891 is Kentucky, which completed the erection of 5 new furnaces in these two years.

Pennsylvania built only 7 new furnaces in 1890 and 1891, and Ohio built only 3, but Illinois built 6, which was relatively a much larger addition to its blast-furnace capacity than that made by either Pennsylvania or Ohio. Illinois now has 20 completed blast furnaces, all using coke, whereas there was not one furnace in operation in this State from 1860 to 1869, in which latter year the first two furnaces at Chicago were completed. There are now 16 furnaces at Chicago and in its immediate vicinity in Cook county.

The furnaces which we have noted as having been abandoned or torn down in 1890 and 1891 include 1 anthracite and 1 charcoal furnace in New York; 3 anthracite furnaces in New Jersey; 1 charcoal, 14 anthracite, and 3 coke furnaces in Pennsylvania; 3 anthracite, 1 coke, and 2 charcoal furnaces in Maryland; 6 charcoal furnaces in Virginia; 2 coke furnaces in West Virginia; 2 charcoal furnaces in Kentucky; 1 charcoal furnace in Tennessee; 1 charcoal furnace in North Carolina; 6 coke furnaces and 1 charcoal furnace in Ohio; 2 coke furnaces in Illinois; and 1 anthracite and 7 charcoal furnaces in Michigan. It is but just to say that most of these furnaces have not recently been active, and that many of them, owing to bad location and antiquated equipment, were virtually abandoned years ago. So long, however, as their owners insisted that they might again be put in blast on short notice we could not place them in the abandoned list. Most of the furnaces now noted as having been abandoned in 1890 and 1891 were of small capacity, whereas nearly all the new furnaces built in these two years are of large capacity and are equipped with improved machinery.

Blast Furnace Capacity.—With 52 new furnaces of modern style and equipment built in 1890 and 1891, and with 58 antiquated and generally small furnaces relegated to the abandoned list in the same years, it may fairly be assumed that the 569 furnaces which are now borne in our active list are furnaces which in the main our country may be proud of. Their aggregate annual capacity is placed by the owners themselves at 16,296,793 net tons, or an average of 28,641 net tons annually for each furnace. Stated differently, the aggregate weekly capacity is 313,400 net tons, or an average of 551 net tons weekly for each furnace. As late as November, 1887, the average annual capacity of the furnaces which were then active or likely to be some day active was 18,885 net tons, or 363 net tons per week, and in November, 1889, the average annual capacity of the furnaces in the same list was 22,901 net tons, or 440 net tons per week. In November, 1887, the aggregate capacity of 582 furnaces was 10,990,993 net tons, and in November, 1889, the aggregate capacity of 575 furnaces was 13,168,233 net tons. The growth in the aggregate and individual capacity of American fur-

naces in the last four years is thus seen to have been remarkable. Of course, as we have often explained, all our blast-furnace capacity can not be utilized at the same time, but it will be seen at a glance that our capacity to-day which can be employed at the same time is beyond any probable requirements of the immediate future, and herein lies the chief cause of the present low prices of pig iron.

Rolling Mills and Steel Works.—In the present edition we enumerate and describe 460 completed rolling mills and steel works in the United States, of which 425 contain trains of rolls and 35 have no rolls. In the edition of two years ago we described 445 completed rolling mills and steel works. In the intervening time 43 new rolling mills and steel works have been built and 28 have been abandoned, the net increase in the period mentioned being 15. In January, 1892, there were 18 rolling mills and steel plants in course of erection, against a total of 11 works which were in course of erection at the close of 1889.

Rolling Mill Capacity.—The production of puddled iron in this country is not by any means a decaying industry, as we have already stated that our production of rolled iron in 1890 was greater than ever before in our history. Our puddling furnaces increased from 4,882 in November, 1887, to 4,914 in November, 1889, and from the latter date to January, 1892, there was a further increase to 5,120.

Bessemer Steel Works.—Our Bessemer steel industry, which has for many years been the first in the world, has been still further developed during the past two years. Since the appearance of our last Directory we have built 6 new standard Bessemer plants—one at Pittsburgh to make steel castings; one at Sparrow's Point, in Maryland, with converters of the largest capacity, to make steel rails chiefly; one at Ashland, Kentucky, to make steel for nail plates and billets; one small plant in Ohio and a larger one at East St. Louis, Illinois, both to make steel castings; and one at West Superior, Wisconsin, to make steel plates, bars, and structural shapes. We now have 46 standard Bessemer plants, with 95 converters. Two new standard Bessemer plants are now in course of erection, both in the Shenango Valley, in Western Pennsylvania, one to produce castings with a single converter and the other with two converters to produce billets. In addition to the standard Bessemer plants above mentioned we now have 5 Clapp-Griffiths and 4 Robert-Bessemer steel plants, the former with 9 converters and the latter with 6 converters. No new Clapp-Griffiths or Robert-Bessemer plants have been built since 1889.

Since the appearance of our last Directory 2 small standard Bessemer plants have been abandoned, one in Ohio and one in Pennsylvania, and in the same time 3 Clapp-Griffiths and 3 Robert-Bessemer plants have also been abandoned. Included in the 46 standard Besse-

mer plants which are described in the present edition is one which was formerly operated as a Clapp-Griffiths plant.

Open-Hearth Steel.—Our open-hearth steel industry has made even greater progress in the last two years than our Bessemer steel industry. Two years ago we noted a great advance in the erection of new open-hearth plants, but during these two years our progress in building open-hearth plants has really been remarkable, especially if it be considered that 1891 was a year of dullness and reaction in our iron and steel industries taken as a whole. During 1890 and 1891 we built 17 new open-hearth steel plants, while only 3 were abandoned, 2 of which were very small plants. We now have 71 completed open-hearth plants, and in addition 4 new plants are in course of erection, while another, a very large one, is nearly completed.

Crucible Steel Works.—Our crucible steel industry makes no progress, but upon the other hand it does not retrograde. Two more crucible plants are enumerated in the present edition than in the edition of two years ago, 6 plants having been abandoned in the meantime and 8 having been built. We now have 45 completed crucible steel plants and one in course of erection, against 43 completed and 3 building two years ago.

Basic Steel.—During the past two years the production of basic steel in this country, chiefly in the open-hearth, has made considerable progress, but it has not yet risen to a position of importance except at two or three works in Pennsylvania. Although much has been claimed for the South as the natural home of the basic process in this country, that section has now only one establishment which is actually making basic steel. Nor has the South made that progress in the last two years in the production of steel of any kind that has been expected of it by its best friends. May it do better in the near future!

Cut Nail Machines.—In November, 1887, there were 81 rolling mills which were devoted in whole or in part to the manufacture of cut nails and spikes, and which contained 6,350 nail machines. In November, 1889, the number of rolling mills which manufactured cut nails and spikes was 75, with 6,066 nail machines. In January, 1892, the number of rolling mills which contained cut-nail machines had declined to 65, and the number of nail machines to 5,546. These figures show a decrease of 804 in the number of cut-nail machines from November, 1887, to January, 1892.

Wire Nail Works.—The wire-nail industry has grown rapidly in this country during the last two years. In the Directory of two years ago we enumerated 37 wire-nail works; in the present edition we enumerate and describe 49 completed wire-nail works and 2 additional works in course of erection. These 51 works are located in 16 States. Their

average capacity is much greater than that of the works of two years ago. In this connection it may be stated that there are now in the United States 21 works which roll iron or steel wire rods and one additional works in course of erection, and that we now have 53 completed iron or steel wire-drawing plants and 2 additional plants in course of erection, all of which are described in the present edition.

Tinplate Works.—In the edition of the Directory which was published two years ago not one establishment in the United States was enumerated which produced tinplates or terne plates, although there were at that time a very few works producing stamped ware which in part tinned their own tinplates from purchased black plates. On October 1, 1890, the McKinley tariff became a law, and one of its provisions increased the duty on tinplates from one cent to two and two-tenths cents per pound, this provision not taking effect, however, until July 1, 1891. With the encouragement given by this provision in the McKinley tariff we are now enabled to enumerate and describe 20 works in the United States which are either making or are prepared to make tinplates or terne plates, and 10 additional tinplate works which are in course of erection.

Forges and Bloomaries.—The classification which has always been observed in the Directory counts all works which make wrought iron direct from the ore as forges and all works which make blooms from pig iron or scrap iron for sale as bloomaries. Works which make blooms in connection with rolling mills and for use exclusively in these rolling mills are, however, not separately classified. They are not independent but auxiliary enterprises.

Since the appearance of the Directory of two years ago the number of forges making wrought iron direct from the ore has greatly declined. This branch of our iron industry, originally embracing forges of the strict Catalan type, has steadily retrograded for many years. Once it was prominent; now it is neglected and almost unnoticed. At the close of 1889 there remained 23 forges in the United States, most of which were in New York and the remainder were in Vermont, New Jersey, Tennessee, and North Carolina. At the present time but 10 forges are left, all of which are in New York except one, which is in New Jersey. We have transferred to the abandoned list every forge in all the other States mentioned, although there is a bare possibility that one or two of these may some day again make a little iron. The number of independent pig-iron and scrap-iron bloomaries has also declined during the past two years. In the present edition we describe 20 of these enterprises, chiefly in Pennsylvania; two years ago we described 27; four years ago we described 37.

Miscellaneous Works.—In the present edition we describe 21 loco-

tive works, not including works operated by railroad companies; 31 wrought-iron pipe works; 43 cast-iron pipe works; 69 car-axle works, not including works operated by railroad companies; 109 car-wheel works, not including railroad works; and 105 car works, not including railroad works.

Natural Gas.—The use of natural gas as fuel in the rolling mills and steel works of the United States was noted in detail in the preface to the edition of this Directory which appeared two years ago. The number of rolling mills and steel works which then used natural gas as fuel in whole or in part was 104, against 96 in November, 1887, 68 in August, 1886, and 6 in September, 1884. These figures indicated a very great increase in a very few years. During the past two years, however, there has been a very great decrease in the use of natural gas by our iron and steel works. The entire number of such works now using natural gas in whole or in part is 74, a reduction of exactly 30 works in two years. Of the total number of iron and steel establishments which were using natural gas two years ago 60 were located at Pittsburgh and in Allegheny county, Pa., 17 in Western Pennsylvania outside of Allegheny county, 6 at Wheeling and its vicinity in West Virginia, 18 in Ohio, and 3 in Indiana. To-day 45 are located at Pittsburgh and in Allegheny county, 11 elsewhere in Western Pennsylvania, 1 in West Virginia, 11 in Ohio, and 6 in Indiana. The development of the natural-gas region in the central part of Indiana has been more marked during the past two years than in preceding years, and this development has resulted in the establishment of several new iron and steel enterprises in Madison, Hancock, Delaware, and Grant counties. But in all the other natural-gas sections of the country the use of natural gas as fuel in our iron and steel works has declined, as has already been stated, owing to the shrinkage in its supply. In most of the works which have been compelled to abandon or partly abandon the use of natural gas a return has been made to the use of bituminous coal, but some of these works have also introduced the use of producer gas made from coal, or of petroleum, and in a few works petroleum or gas made from coal is now principally used. There is observable, indeed, a strong tendency in many sections of the country to use producer gas or petroleum in the manufacture of iron and steel. In the detailed descriptions of rolling mills and steel works in the present edition of the Directory due prominence is given to these new fuels.

Canada and Mexico.—A new feature of the present edition which will gratify all who have occasion to consult its pages is a list of the blast furnaces, rolling mills, and steel works of Canada and Mexico.

GRAND SUMMARY.

IRON AND STEEL WORKS.	January, 1892.	November, 1889.
Number of completed Blast Furnaces—267 Bituminous, 164 Anthracite and Coke, and 138 Charcoal: total,	569	575
Number of Blast Furnaces building—10 Bituminous and 1 Charcoal: total,	11	27
Annual capacity of completed Blast Furnaces, net tons,	16,296,793	13,168,233
Annual capacity of the Bituminous Furnaces, net tons,	11,309,700	8,223,500
Annual capacity of the Anthracite Furnaces, net tons,	3,582,193	3,723,333
Annual capacity of the Charcoal Furnaces, net tons,	1,404,900	1,221,400
Number of completed Rolling Mills and Steel Works,	460	445
Number of Rolling Mills and Steel Works building,	18	11
Number of Single Puddling Furnaces, (a double furnace counting as two single ones,)	5,120	4,914
Number of Heating Furnaces,	2,913	2,733
Number of Trains of Rolls,	1,592	1,510
Annual capacity of completed Rolling Mills, net tons,	11,831,294	9,215,000
Number of Rolling Mills having Cut-nail Factories,	65	75
Number of Cut-nail Machines,	5,546	6,066
Number of Cut-nail Factories building,	1	1
Number of Cut-nail Machines to be used in the new Factories,	100	100
Number of Wire-nail Works,	49	37
Number of completed standard Bessemer Steel Works,	46	41
Number of Bessemer Steel Works building,	2	1
Number of completed standard Bessemer Converters,	95	88
Annual capacity (built and building) in ingots, net tons,	6,560,000	5,600,000
Number of completed Clapp-Griffiths Steel Works,	5	8
Number of Clapp-Griffiths Converters,	9	14
Annual capacity in ingots, net tons,	170,000	200,000
Number of completed Robert-Bessemer Steel Works,	4	7
Number of Robert-Bessemer Steel Works building,	1	1
Number of Robert-Bessemer Converters—6 completed and 2 partly built,	6	11
Number of completed Open-Hearth Steel Works,	71	56
Number of Open-Hearth Steel Works building—4 building and 1 standing nearly completed,	4	5
Number of Open-Hearth Furnaces—164 completed, 7 building, and 7 standing nearly completed,	164	116
Annual capacity (built and building) in ingots, net tons,	1,550,000	1,200,000
Number of completed Crucible Steel Works,	45	43
Number of Crucible Steel Works building,	1	3
Number of Steel-melting Pots which can be used at each heat,	2,934	3,378
Annual capacity in ingots, net tons,	105,000	111,500
Number of Forges making wrought iron from ore,	10	23
Annual capacity in blooms and billets, net tons,	21,200	45,000
Number of pig and scrap iron Bloomaries,	20	27
Annual capacity in blooms, net tons,	36,000	44,000

SUMMARY BY STATES.

BLAST FURNACES.

STATES.	Furnaces Completed January, 1892.				Furnaces Building January, 1892.				Annual Capacity of Completed Furnaces January, 1892, 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							19,500	19,500
Connecticut,			9	9							41,500	41,500
New York,	25	3	9	37					565,000	121,000	67,500	753,500
New Jersey,	15			15					274,345			274,345
Pennsylvania,	124	80	15	219					2,742,848	3,858,200	61,700	6,662,748
Maryland,		5	8	13					409,000	54,200		463,200
Virginia,		19	14	33		6		6	625,000	52,000		677,000
West Virginia,		4		4					184,000			184,000
Kentucky,		7	3	10					227,000	53,000		280,000
Tennessee,		13	6	19		3	1	4	392,000	56,000		448,000
North Carolina,		1		1		1		1	6,000			6,000
Georgia,		2	4	6					60,000	47,000		107,000
Alabama,		38	15	53					1,407,000	211,000		1,618,000
Texas,			4	4						58,000		58,000
Ohio,		60	12	72					2,123,500	53,000		2,176,500
Indiana,		2		2					30,000			30,000
Illinois,		20		20					1,365,000			1,365,000
Michigan,			23	23						436,000		436,000
Wisconsin,		4	6	10					177,000	116,500		293,500
Minnesota,		1		1					50,000			50,000
Missouri,		5	3	8					175,000	47,000		222,000
Colorado,		3		3					100,000			100,000
Oregon,			1	1						15,000		15,000
Washington,			1	1						10,000		10,000
Total,	164	267	138	569		10	1	11	3,582,193	11,309,700	1,404,900	16,296,793

From November, 1889, to January, 1892, we have transferred to the abandoned list 58 furnaces, 2 in New York, 3 in New Jersey, 13 in Pennsylvania, 6 in Maryland, 6 in Virginia, 2 in West Virginia, 2 in Kentucky, 1 in Tennessee, 1 in North Carolina, 7 in Ohio, 2 in Illinois, and 8 in Michigan. During the same period 52 new furnaces have been built, 1 in Connecticut, 7 in Pennsylvania, 3 in Maryland, 7 in Virginia, 5 in Kentucky, 1 in Tennessee, 1 in Georgia, 9 in Alabama, 3 in Texas, 3 in Ohio, 6 in Illinois, 4 in Michigan, 1 in Minnesota, and 1 in Colorado.

SUMMARY BY STATES.

ROLLING MILLS, STEEL WORKS, FORGES, AND BLOOMARIES.

STATES.	Rolling Mills and Steel Works.	Iron and Steel Rolling Mills.*	Cut-Nail Machines.	Steel Works.					Forges and Bloomaries.
				Bessemer.	Clapp-Griffiths.	Robert-Bessemer.	Open-hearth.	Crucible.	
Maine,	1	1	.. .	..	..	..	..	..	..
New Hampshire, .	1	1	.. . .	..	..	..	1	..	..
Massachusetts, .	14	13	326	2	1	..	2	1	..
Rhode Island, .	1	1	.. . .	..	..	..	..	..	..
Connecticut, . .	8	8	.. .	..	..	..	..	3	..
New York, . . .	23	19	.. . .	1	..	..	4	4	9
New Jersey, . .	20	19	193	..	..	..	3	6	3
Pennsylvania, .	211	192	1,555	18	3	1	38	24	14
Delaware, . . .	9	9	.. . .	..	..	..	..	..	..
Maryland, . . .	6	6	.. . .	1	..	..	..	1	2
Virginia,	8	8	146	1	..	..	..	..	1
West Virginia, .	7	7	856	2	..	..	..	..	..
Kentucky, . . .	8	8	126	1	..	..	1	..	..
Tennessee, . .	5	4	115	2	..	..	1	1	..
Georgia,	1	1	.. . .	..	..	..	..	..	..
Alabama,	10	9	77	..	..	..	2	..	1
Texas,	2	2	.. . .	..	..	..	..	..	..
Ohio,	59	56	1,215	6	..	..	10	2	..
Indiana,	18	16	366	1	..	1	1	2	..
Illinois,	26	23	398	8	1	1	6	..	..
Michigan, . . .	4	4	.. . .	..	..	1	1	1	..
Wisconsin, . . .	2	2	.. . .	1	..	..	..	..	..
Minnesota, . . .	2	2	.. . .	..	..	..	..	..	..
Missouri,	6	6	50	1	..	..	..	..	..
Iowa,	1	1	.. . .	..	..	..	..	..	..
Colorado,	2	2	27	1	..	..	..	..	..
Wyoming,	1	1	.. .	..	..	..	..	..	..
California, . . .	4	4	96	..	..	..	1	..	..
Total,	460	425	5,546	46	5	4	71	45	30

Number of rolling mills building, 17. Number of steel plants building, 7, (2 Bessemer, 4 open-hearth, and 1 crucible,) all except one connected with rolling mills.

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

The number of wire-nail works in the United States is 49, with 2 more in course of erection, situated in 16 States, as follows: Massachusetts, 11; Rhode Island, 1; Connecticut, 3; New York, 5; New Jersey, 1; Pennsylvania 8, and 1 building; Virginia, 1; Ohio, 7; Indiana, 3; Illinois, 3; Michigan, 1; Missouri, 1; Iowa, 1; Nebraska, 1; Washington, 1 building; California, 2.

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 will be found separately printed after the following list of furnaces, which are either active or can readily be 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. Idle since the spring of 1890.

Number of furnaces in Maine: 1 charcoal stack.

MASSACHUSETTS.

CHARCOAL.

Lanesborough Furnace, E. T. Slocum, Trustee for creditors, Pittsfield. 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, 15,000 net tons of foundry pig iron for cannon, car-wheels, and machinery. Brand, "Richmond." Main office at Richmond Furnace P. O. George Church, President, Great Barrington, Mass.; Porter S. Burrall, General Manager, Lime Rock, Conn.; R. A. Burget, Treasurer, Richmond Furnace.

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 castings, 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.

Chapinville Furnace, The Landon Iron Company, Chapinville, Litchfield county. One stack, 32 x 9, built in 1825, burned in 1879, and rebuilt in 1881 and 1890; one Gifford stove; water-power; ore, brown hematite from the Salisbury district, Conn., and from Amenia, N. Y.; product, car-wheel pig iron; annual capacity, 4,500 net tons. Brand, "Salisbury, 1825." F. Kingsbury Curtis, President; F. J. Kingsbury, Vice-President; A. M. Card, Secretary; J. J. Morehouse, Treasurer and General Manager.

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. Milo B. Richardson, President, Lime Rock; James A. Bierce, Secretary and Treasurer, Cornwall Bridge.

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, and 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, car-wheel pig iron; annual capac-

ity, 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 castings; 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; Charles W. Barnum, Treasurer, and Milo B. Richardson, Secretary, Lime Rock.

Number of furnaces in Connecticut: 9 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. Idle for several years, and 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, 50,000 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, Box 704, Rochester, Monroe county. Office and works 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." A. G. Yates, President; J. E. Roberts, Vice-President; A. S. Clarke, Secretary and Treasurer.

Cold Spring Furnace, 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. Title held by E. M. Cook, 1 Broadway, New York. Idle and for sale.

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; the second stack rebuilt in 1881; six Siemens-Cowper-Cochrane stoves, three 45 x 15 and three 60 x 16; 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." Chester Griswold, 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.

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. Idle and for sale. *See Rolling Mills.*

Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. One stack, 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. 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, brown hematite from West Stockbridge, Mass., red hematite from Antwerp, N. Y., red specular from Lake Superior, and magnetic from Port Henry and Forest of Dean mines, New York; fuel, anthracite coal; product, principally best grades of foundry iron, although it is also used for best grades of bar iron; total annual capacity, 26,000 net tons. Brand, "Hudson." John E. Gillette, President; Samuel R. Rainey, Secretary and Treasurer; S. C. McArthur, General Agent.

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." I. A. Williams, President, General Manager, and Treasurer, Utica; Thomas S. Jackson, Secretary, Kirkland.

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." Owned by John P. Jones, of Gold Hill, Nevada, and others. J. L. Cunningham, Agent, 151 Church st., New York. Idle for several years.

Port Henry Furnaces, Port Henry Furnace Company, Port Henry, Essex county. Two stacks, situated on the banks of Lake Champlain, each 66 x 16, built in 1853 and 1861, and rebuilt in 1868, 1871, and 1887; ore, 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, $\frac{1}{2}$ Dutchess county brown hematite, $\frac{1}{2}$ Lake Champlain magnetic, and $\frac{1}{2}$ Forest of Dean, Orange county; fuel, anthracite coal; 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.

Sterling Iron and Railway Company, 43 Wall 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." Macgrane Coxé, President; Louis C. Clark, Treasurer; P. T. Barlow, Secretary.

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

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

COKE.

Niagara Furnace, Tonawanda Iron and Steel Company, Tonawanda, Erie county. Furnace at North Tonawanda, Niagara county. One stack, 76 x 17, built in 1873, and rebuilt by the present company in 1890-1; three Cowper-Kennedy stoves, each 70 x 18; ores, hematite and specular from Lake Superior; fuel, coke; product, foundry pig

iron; annual capacity, 85,000 net tons. Brand, "Niagara." William A. Rogers, President; Archer Brown, Vice-President; George G. Hamilton, Secretary; William A. Gamble, Treasurer; W. B. Kerr, Superintendent. Selling agents, Rogers, Brown & Co., Buffalo, Philadelphia, and Cincinnati.

Onondaga Iron Company, 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; ores, from Old Sterling mines, New York, and Lake Superior; fuel last used, coke; product, foundry pig iron; total annual capacity, 36,000 net tons. (Operated during part of 1890 and 1891 by the American-Scotch Iron Company, composed of members of the firm of Warren, Wood & Co., of New York, producing the "Trimo" and "Mohawk" brands of foundry pig iron.) A. J. Belden, Secretary.

Number of coke furnaces in New York: 3 stacks. .

PROJECTED.

Union Iron Works, Buffalo, Erie county. Work commenced on the foundations of a furnace on the site of the three demolished furnaces of the old Union Iron Works. New furnace to be 80 x 18, and equipped with three Cowper-Kennedy stoves; product to be strong foundry pig iron, made from Lake Superior ores, smelted with coke. Company being organized by F. B. Baird, of Buffalo. Julian Kennedy, Supervising Engineer, Pittsburgh, Pa.

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; total annual capacity, 18,000 net tons. J. J. Belden, President; M. A. Knapp, Secretary; William Boone, Treasurer, all at Syracuse. Idle for several years.

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, pig iron for car-wheels and malleable castings; 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 its mines at West Pittsfield, Mass., and "Harlem Valley" hematite from Columbia and Dutchess counties; product, pig iron for car-wheels, cannon, chilled rolls, etc.; 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.

Copake Iron Works, Frederick Miles, Copake Iron Works P. O., Columbia county. One stack, 32 x 9, built in 1872; open top; iron stoves; ore, limonite from Clove Spring mine, Dutchess county; specialty, car-wheel pig iron; annual capacity, 4,000 net tons.

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 stoves; ore, Salisbury; annual capacity, 12,000 net tons. Specialty, car-wheel pig iron. Brand, Salisbury." M. B. Richardson, Lime Rock, Conn., in charge of property for bondholders' committee.

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, 5 East Sixty-third st., New York. Idle for several years.

Wassaic Furnace, Estate of Noah Gridley, Miles K. Lewis, Receiver, 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 for several years, and for sale.

Number of charcoal furnaces in New York: 9 stacks. Total number of furnaces in New York: 37 completed stacks, and 1 stack projected.

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; ores, magnetite from the company's mines and Lake Superior red hematite; 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; Joseph C. Kent, Superintendent, Phillipsburg.

Franklin Iron Company, Franklin Furnace P. O., Sussex county. One stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; Cooper stoves; fuel, anthracite coal and coke; ores, New Jersey, New York, and some foreign; product, Bessemer pig iron; annual capacity, 29,000 net tons. E. F. Hatfield, President, H. V. Vultee, Secretary, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. W. Pierce, Superintendent, at the works.

Musconetcong Furnaces, Musconetcong Iron Works, Stanhope, Sussex county. Two stacks, 70 x 17½ 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; J. Wesley Pullman, 238 South Third st., Philadelphia.

New Jersey Zinc and Iron Company, Newark, Essex county. Sales office, 98 William st., corner Platt st., 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 a 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, 18,000 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; Fritz Gleim, 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; Durham iron pipe stoves; ores, New Jersey magnetic and foreign; fuel, ¾ anthracite coal and ¼

Connellsville coke; 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.*

Ringwood Furnace, Cooper & Hewitt, Hewitt, Passaic county. One stack, 48 x 13, altered from charcoal to anthracite in 1872; open top; water-power; ore, magnetic, mined at Ringwood. New York office, 17 Burling Slip. Idle for several years. *See Pequest Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Secaucus Iron Company, Secaucus, Hudson county. Telegraph address, Kingsland. One stack, 65 x 17, completed in 1877, and first blown in in June, 1879; Cooper iron pipe stoves; ores, foreign hematite and New York and New Jersey magnetic; fuel, anthracite coal; product, Bessemer pig iron; annual capacity, 30,000 net tons. Brand, "Secaucus." A. Pardee, President, Hazleton, Pa.; I. P. Pardee, Secretary and Treasurer, Stanhope, N. J.; Kenneth Robertson, Superintendent. 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; Kent stoves; 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; John R. Bennett, Manager.

Wharton Furnace, Tooke Straker, Manager, Port Oram, Morris county. One stack, 75 x 16, built in 1868, and first blown in in 1869; remodeled in 1889; improved Durham hot-blast stoves; ores, North Jersey magnetic and Lake Superior hematite; fuel, anthracite coal and coke; product, neutral foundry and forge pig iron; annual capacity, 25,000 net tons. Formerly called Port Oram Furnace. Joseph Wharton, proprietor, Philadelphia.

Number of furnaces in New Jersey: 15 anthracite and mixed anthracite and coke stacks.

PENNSYLVANIA.

LEHIGH VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Allentown Iron Works, Allentown Iron Company, Allentown, Lehigh county. Philadelphia office, 226 South Third st. Two stacks: No. 4, 60 x 16 $\frac{1}{2}$, built and blown in in 1886; and No. 5, 60 x 17, built in 1872, and blown in in 1873; fuel, anthracite coal and coke; ores, New York, New Jersey, and Pennsylvania magnetic and local hematite; specialty, foundry pig iron; total annual capacity, 50,000 net tons. Brand, "Allentown." (Four stacks, built in 1846 and 1853, have been abandoned.) J. S. Harris, President, and C. F. Howell, Secretary and Treasurer, Philadelphia; Edward T. Clymer, Manager, Allentown.

Allentown (The) Rolling Mills, 237 South Third st., Philadelphia.

Works at Allentown. Two stacks, each 68 x 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. Eight stacks, six owned and two leased, five at South Bethlehem and three at other places, all in Northampton county: No. 1, 61 x 15½, built in 1863; No. 2, 70 x 16, built in 1867; No. 4, 70 x 16, built in 1874-5; No. 5, 70 x 19, built in 1874-5; No. 6, 70 x 16, built in 1881; No. 7, (Bingen,) 65 x 17, situated at Bingen, built in 1870; Nos. 2 and 6 are equipped with Siemens-Cowper-Cochrane stoves; the others have iron stoves. Lucy Furnace, 65 x 14, leased from the Lucy Iron Company, situated at Glendon, built in 1872, and rebuilt in 1880; Northampton Furnace, 65 x 15, leased from the Northampton Iron Company, situated at Freemansburg, first blown in July 17, 1873. Product, Bessemer pig iron, from local and foreign hematite and magnetic ores; fuel, anthracite coal and Connellsville coke; total annual capacity, 200,000 net tons. (No. 3 Furnace, built in 1868, is not likely to be again put in blast.) *See Rolling Mills and Steel Works.*

Carbon Iron Works, Carbon Iron and Pipe Company Limited, Mauch Chunk, Carbon county. Works at Parryville, in the same county. Three stacks, 52 x 13, 52 x 16, and 65 x 16, built in 1855, 1864, and 1869, respectively; fuel, anthracite coal and coke; ores, hematite from Lehigh, Northampton, and Carbon counties, magnetic from New Jersey and Lake Champlain, and foreign; total annual capacity, 35,000 net tons. Product known as "Carbon" iron. M. S. Kemmerer, Chairman, and George Ruddle, Secretary and Treasurer, Mauch Chunk; H. J. Seaman, Superintendent, Parryville.

Coleraine Iron Works, William T. Carter & Co., 302 Walnut st., Philadelphia. Works at Reddington, Northampton county. Two stacks, each 60 x 17, built in 1869 and 1872; fuel, anthracite coal; ores, ½ hematite and ½ magnetic, from Pennsylvania, New Jersey, and the Lake Superior region; product, foundry pig iron; total annual capacity, 45,000 net tons.

Coplay Iron Company, Coplay, Lehigh county. Three stacks: one, 48 x 14, built in 1853, one, 55 x 16, built in 1862, open tops; and one, 70 x 15, built in 1868 and rebuilt in 1889, closed top; ores, Lehigh county hematite and New Jersey magnetic; product, principally foundry pig iron; total annual capacity, 55,000 net tons. E. P. Wilbur, President, W. A. Wilbur, Secretary, and R. M. Gummere, Treasurer, Bethlehem; Horace Boyd, Superintendent, Coplay.

Crane Iron Works, Crane Iron Company, 224 South Fourth st., Philadelphia. Works at Catasauqua, Lehigh county. Four stacks: two

75 x 18 and two 60 x 16. Original furnaces were built in 1839, 1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881; one has iron stoves and three have Whitwell stoves; fuel, anthracite coal and coke; ores, New Jersey magnetic, Pennsylvania hematite, Lake Superior, and foreign; specialties, foundry, open-hearth, and Bessemer pig iron; total annual capacity, 150,000 net tons. Brands, "Crane," "Castle," and "Mohican." Samuel Dickson, President; H. W. Hazard, Vice-President; James M. Hodge, Secretary and Treasurer. Officers at Catasauqua: Leonard Peckitt, Superintendent; John Williams, Cashier. *See Macungie and Edge Hill Furnaces.*

Crumwold Furnace, Robert H. Coleman, Trustee and lessee, Lebanon. Furnace at Emaus, Lehigh county. One stack, 66 x 16, completed and first put in blast October 10, 1872; rebuilt in 1879-80; remodeled in 1890 and equipped with three 60 x 18 Gordon-Whitwell-Cowper firebrick stoves; ore, Cornwall; fuel, anthracite coal and coke; product, Cornwall Bessemer pig iron; annual capacity, 32,000 net tons. Formerly called Emaus Furnace. A. Hess, Business Manager, Lebanon; Albert Broden, General Manager, Reading. *See Colebrook Furnaces.*

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, 43,148 net tons. Brand, "Durham." B. F. Fackenthal, Jr., General Superintendent. Selling agents, J. Tatnall Lea & Co., Philadelphia. *See Pequest and Ringwood Furnaces, New Jersey.*

Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Established in 1843. Furnaces situated at Glendon, near Easton. Four stacks: No. 1, 63 x 15; No. 2, 81 x 18; No. 3, 80 x 18; and No. 5, 72 x 18. Original furnaces were first blown in in 1844, 1845, 1850, and 1869; rebuilt since then, and Nos. 1, 2, and 3 remodeled in 1888, 1889, and 1890; ores, hematite from Northampton county, Pa., and the Lake Superior region, and magnetic from Morris county, N. J.; fuel, a mixture of $\frac{3}{4}$ anthracite coal and $\frac{1}{4}$ coke; specialty, forge pig iron; total annual capacity, 100,000 net tons. Brand, "Glendon." (No. 4 Furnace, at South Easton, built in 1852, was torn down in 1890.) 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. Selling agents, J. Tatnall Lea & Co., Philadelphia; C. L. Peirson & Co., Boston.

Lehigh Iron Company, Allentown, Lehigh county. Two stacks: No. 1,

65 x 16, completed July 22, 1869, rebuilt in 1886; No. 2, 60 x 15, 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; Harrison Bortz, Vice-President and Superintendent; Robert J. Marsteller, Secretary; Frank J. Rimmel, Cashier.

Lehigh Zinc and Iron Company, Bethlehem, Northampton county. Main office, 925 Chestnut st., Philadelphia. One stack, 33 x 8½, first put in blast in February, 1882; fuel, anthracite coal and coke; iron stoves; product, spiegeleisen, from zinc residuum; annual capacity, 3,000 net tons. Richard Heckscher, President; S. P. Wetherill, Vice-President; J. Price Wetherill, General Manager; August Heckscher, Treasurer; J. H. Troutman, Assistant Treasurer; T. Lewis Thomas, Secretary.

Macungie Furnace, Crane Iron Company, lessee, 224 South Fourth st., Philadelphia. Furnace at Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in September 14, 1874; fuel, anthracite coal and coke; product, Bessemer pig iron; annual capacity, 17,000 net tons. *See Crane Iron Works and Edge Hill Furnace.*

Thomas Iron Works, Thomas Iron Company, Hokendauqua, Lehigh county. Eleven stacks, located as follows: six at Hokendauqua, two (Lock Ridge) at Alburtis, Lehigh county, two (Saucon) at Hellertown, Northampton county, and one (Keystone) 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 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 and one at Hokendauqua have fire-brick 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 Furnace; S. Neumoyer, Superintendent of Saucon Furnaces. Sales made by B. G. Clarke, 52 Wall st., New York; J. T. Knight, Easton; and Lyman & Co., Willing's alley, Philadelphia.

Number of furnaces in the Lehigh Valley: 45 stacks.

SCHUYLKILL VALLEY—ANTHRACITE, MIXED ANTHRACITE AND COKE, 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, 45,000 net tons. Brand, "Anvil." *See Rolling Mills.*
- Edge Hill Furnace, Crane Iron Company, lessee, 224 South Fourth st., Philadelphia. Furnace at Edge Hill, Montgomery county. One stack, 65 x 16½, built in 1869-72; first blown in in January, 1872; fuel, anthracite coal and coke; product, Bessemer pig iron; annual capacity, 28,000 net tons. Lease expires January 1, 1892. Furnace owned by the Edge Hill Furnace Company, 206 Walnut Place, Philadelphia. *See Crane Iron Works and Macungie Furnace.*
- Elizabeth Furnace, West Conshohocken, Montgomery county. One stack, 50 x 16, built in 1872, and put in blast October 24, 1872; remodeled in 1883; annual capacity, 20,000 net tons. (Merion Furnace, 48 x 16, built in 1847, enlarged in 1876, and remodeled in 1883; abandoned in 1890.) For sale or lease. Apply to Estate of J. B. Moorhead, care Guarantee Trust and Safe Deposit Company, 318 Chestnut st., Philadelphia.
- Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13: one built in 1842, and blown in in August, 1844, and the other built in 1855, and blown in in September, 1856; 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."
- Keystone Furnaces, E. and G. Brooke Iron Company, Birdsboro, Berks county. Three stacks: one, 50 x 12, built in 1853; one, 57 x 15, built in 1871; one, 66 x 15, 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, 70,000 net tons. Brand, "Keystone." *See Rolling Mills.*
- Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One stack, 58 x 16, built in 1852, and first blown in in 1853; 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 Samuel C. Le Maistre, Secretary and Treasurer, 235 South Third st., Philadelphia.

Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, 65 x 14, built in 1854, and first blown in in 1856; remodeled in 1863, 1869, and 1890; three Taws & Hartman stoves; ore, foreign; product, Bessemer pig iron and low-phosphorus iron for crucible and open-hearth steel purposes; annual capacity, 30,000 net tons. Brands: for Bessemer iron, an arrow, on the shaft of which are M * B; for low-phosphorus iron, an arrow, on the shaft of which are three circles, each containing the letter P. Philadelphia office, 330 Walnut st. 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; two stoves; annual capacity, 8,000 net tons. Idle and 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, principally foreign; product, standard Bessemer pig iron; annual capacity, 28,000 net tons. James Hooven, owner.

Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Three stacks: Norway, Port Carbon, and Ringgold. Norway Furnace, at Bechtelsville, Berks county; one stack, 58½ x 15½, built in 1875 and first blown in in 1880; open top; two Player stoves; annual capacity, 19,000 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 idle and for sale or lease. The Crumwold Furnace, at Emaus, Lehigh county, also owned by this company, is operated by R. H. Coleman, and is described elsewhere. A. A. McLeod, President; Albert Broden, Engineer, Reading, Pa. *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 projected: No. 2, 60 x 13, built in 1866; and No. 3, 65 x 14, built in 1872; two Player and two Cooper iron stoves; fuel, anthracite coal; ores, foreign, Lake Superior, and New Jersey magnetic; product, Bessemer and mill pig iron; annual capacity, 32,000 net tons. Brand, "Pioneer." The projected furnace is to be 70 x 15. *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, 65 x 14½ and 50 x 15, built in 1869 and 1872-3, respectively; ores, Lake Superior, local hematite, and New Jersey and New York magnetic; 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 1855, enlarged in 1873, and rebuilt in 1885; four Whitwell stoves; fuel, coke; Cornwall ore is exclusively used; product, Bessemer pig iron; annual capacity, 50,000 net tons. Brand, "Robesonia." (The old Robesonia Furnace, built in 1792 and rebuilt in 1845, was blown out for the last time in 1874 and dismantled in 1884.) W. C. Freeman, Chairman, Cornwall; William R. White, Secretary, Philadelphia; George R. Taylor, 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, 75 x 15, built in 1874-5; ores, Cornwall and local; fuel, anthracite coal and coke; product, principally foundry pig iron; total annual capacity, 62,000 net tons. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.

Swede Furnaces, R. Heckscher & Sons, Swedeland, Montgomery county. Main office, 238 South Third st., Philadelphia. Two stacks: No. 1, 73 x 14, built in 1850, and rebuilt in 1881 and 1887; No. 2, 80 x 15½, built in 1890-1; No. 1 has four Durham iron stoves and No. 2 three Taws & Hartman regenerative stoves, each 70 x 18; fuel, anthracite coal and coke; ores, Lake Superior and New Jersey magnetic; product, mill pig iron; annual capacity of No. 1, 38,000 net tons; No. 2, 50,000 tons. Brand, "Swede." A. Watters, Superintendent.

Temple Furnace, Temple Iron Company, Reading. Furnace at Temple, Berks county. One stack, 55 x 14, built in 1867, and rebuilt in 1875; iron stoves; ores, Lake Superior and local hematite and New Jersey magnetic; fuel, anthracite coal and coke; specialty foundry pig iron;

- annual capacity, 27,000 net tons. Brand, "Temple." George F. Baer, President; Albert Broden, Manager; F. C. Smink, Treasurer.
- Topton Furnace Company, Isaac Eckert, Manager, Topton, Berks county. One stack, 70 x 16, built in 1873, and remodeled in 1888; ores, Lake Superior and local hematite; fuel, anthracite coal and coke; product, "Sheridan" foundry pig iron; annual capacity, 25,000 net tons. Henry S. Eckert, William M. Kaufman, and Isaac Eckert, owners. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.
- Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery county. One stack, 70 x 16, built in 1875, and first blown in in April, 1876; enlarged to present size in 1889; Durham iron stoves; fuel, $\frac{3}{4}$ anthracite coal and $\frac{1}{4}$ coke; specialty, mill pig iron; annual capacity, 44,000 net tons. Brand, "Warwick." Edgar S. Cook, President; V. P. McCully, Secretary; Jacob Fegely, Treasurer. Selling agent, J. Wesley Pullman, 238 South Third st., Philadelphia.
- Wellman Furnace, Wellman Iron and Steel Company, Thurlow, Delaware county. Philadelphia office, 220 South Fourth st. One stack, 70 x 17, 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. Iron consumed in the Bessemer works of the company. Formerly called Chester Furnace. *See Rolling Mills.*
- Number of mineral fuel furnaces in the Schuylkill Valley: 35 completed stacks, and 1 stack projected.

UPPER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 55 x 13, built in 1853-4, and blown in April 14, 1854; rebuilt in 1881 and 1886; three iron stoves; ores, fossil, mined in the vicinity, hematite from Lake Superior, and magnetic from New Jersey and New York; product, gray forge and No. 2 foundry pig iron; annual capacity, 14,500 net tons. Brand, "Bloom."
- Chulasky Furnace, B. R. 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 and for sale.
- 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 Lake Superior hematite; specialty, mill pig iron; annual capacity, 20,000 net

tons. Brand, "Duncannon." Arrangements, made for adding 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 Steel Company, Scranton, Lackawanna county. New York office, 52 Wall st. 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 from Lake Champlain and Putnam county, N. Y., with some Lake Superior; product, Bessemer pig iron; total annual capacity, 125,000 net tons. Brand, "Lackawanna." A. H. Lee, Superintendent of furnaces. *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. *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, 40,000 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 mineral fuel furnaces in the Upper Susquehanna Valley: 17 stacks.

LOWER SUSQUEHANNA—ANTHRACITE, MIXED ANTHRACITE AND COKE,
AND COKE.

Aurora Furnace, Steacy and Denney Company, (incorporated,) Wrightsville, York county. Main office, York. One stack, 65 x 14½, built in 1867, rebuilt in 1874, and remodeled in 1886-7; 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, 25,000 net tons. *See Rolling Mills.*

Bird Coleman and North Cornwall Furnaces, W. C. Freeman, Chairman, Cornwall, Lebanon county. Three 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. North Cornwall Furnace, owned by Mrs. M. C. Freeman: one stack, 80 x 18, built in 1872-4, and rebuilt in 1890. Equipped with Whitwell stoves; use Cornwall ore exclusively; fuel, coke; specialty, Bessemer pig iron. (Donaghmore Furnace abandoned in 1891.) 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; annual capacity, 9,000 net tons. Brand, "Cameron." James Young, President; P. C. Elberti, Secretary. Idle for several years.

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Company, B. Frank Conner, Superintendent, Columbia, Lancaster county. Two stacks: one, 60 x 14, built in 1854, and remodeled in 1881; and one, 60 x 14, built in 1868, and remodeled in 1886; 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.

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; ores, magnetic from Cornwall, Lebanon county, and Chestnut Hill brown hematite from Silver Spring, Lancaster county; fuel, anthracite coal and coke; product, foundry and mill pig iron; annual capacity, 37,000 net tons. Brand, "Chickies." C. Ross Grubb, President; Horace L. Haldeman, Secretary, Treasurer, and Superintendent. Selling agents, Justice Cox, Jr., & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; Charles W. Gleason & 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; fuel, coke and anthracite coal; product, principally Bessemer pig iron; total annual capacity, 130,000 net tons. *See Crumwold Furnace.*

- 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 magnetite and Chestnut Hill hematite; product, "Chickies" pig iron, exclusively for the Chickies Iron Company. Out of blast since February, 1888. C. Ross Grubb, President; Henry B. Grubb, Vice-President; Horace L. Haldeman, Treasurer; Frank Nisley, Secretary.
- Cordelia Furnace, Cordelia Iron Company, Cordelia, Lancaster county. One stack, 50 x 13, built in 1848, and rebuilt in 1859; one Thomas iron stove; ores, hematite and magnetite from Pennsylvania, Maryland, and New Jersey; specialty, foundry pig iron; annual capacity, 9,000 net tons. Brand, "Cordelia." H. A. Muhlenberg, President; Isaac McHose, Treasurer and General Manager; Isaac McHose, Jr., Secretary. Idle since 1888.
- 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; annual capacity, 14,000 net tons. 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. Mrs. Debbie B. Coleman, proprietor.
- 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."
- Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two stacks, 75 x 14 and 60 x 13, 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 Swatara Furnace. 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 sup-

plied 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 magnetite; product, Bessemer pig iron and spiegeleisen; total annual capacity, 175,000 net tons. *See Rolling Mills.*

Ruby Furnace, Estate of Albert Ferguson, Colebrook, Lebanon county. One stack, 30 x 6½, built and blown in in 1885; suspended pipe stove; fuel, Connellsville coke; product, red-short pig iron reduced from furnace slag; annual capacity, 6,700 net tons. John H. Scott, Manager. Selling agents, L. & R. Wister & Co., Philadelphia.

St. Charles Furnace, Charles B. Grubb, Lancaster. Works at Columbia, Lancaster county. One stack, No. 1, 52 x 14, built in 1853; fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, and Conestoga; product, pig iron for boiler plate, bars, nails, or foundry work; annual capacity, 17,000 net tons. Brand, "Grubb." (No. 2 stack abandoned in 1889.) Ed. B. Eckman, Manager, Columbia.

Swatara Furnace, McCormick Estate, 223 Market st., Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854, and remodeled in 1880; fuel, anthracite coal and coke; ores, magnetite, 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 since 1887. *See Paxton Furnaces. See Rolling Mills.*

Vesta Furnace, Columbia Rolling Mill Company, Columbia. Furnace at Vesta, Lancaster county. Formerly called Musselman Furnace. One stack, 65 x 14, built in 1868, rebuilt in 1881, and remodeled in 1886 and 1890; two Whitwell stoves; fuel, anthracite coal and coke; ores, hematite and magnetite from Cumberland and Perry counties; product, neutral forge and foundry pig iron; annual capacity, 19,000 net tons. Brand, "Vesta." *See Rolling Mills.*

Number of mineral fuel furnaces in the Lower Susquehanna Valley: 31 stacks.

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, 32,000 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.

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Philadelphia office, 216 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, Lake Superior red hematite, carbonate, and red fossiliferous; product, gray forge pig iron; annual capacity, 8,500 net tons. *See Greenwood (charcoal) Furnace. See Rolling Mills.*

Everett Furnace, Joseph E. Thropp, Everett, Bedford county. Philadelphia office, 119 South Fourth st. One stack, 75 x 18, built in 1883-4, and first blown in December 9, 1884; three Siemens-Cowper-Cochrane stoves; fuel, Broad Top coke, from coal mined and coked on the furnace property at Kearney; ores, Juniata fossil and hematite and Lake Superior hematite; product, soft and strong foundry pig iron; annual capacity, 45,000 net tons. Brand, "Everett." Selling agents, Jerome Keeley & Co., 303 Walnut st., Philadelphia.

Gap Furnace, Hollidaysburg and Gap Iron Works, Joseph Fichtner, Receiver, 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.

Juniata Furnace and Foundry Company, Newport, Perry county. Philadelphia office, Beach and Marlborough sts. One stack, 60 x 13, built in 1871, and blown in in July, 1872; remodeled in 1888; two Durham iron stoves; fuel, anthracite coal and coke; ores, local magnetite, fossil, and hematite; product, foundry pig iron; annual capacity, 20,000 net tons. Brand, "Marshall." Formerly called Marshall Furnace. P. Hiestand, Superintendent.

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, 25,000 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, John S. Slagle & Co., Pittsburgh.

Lucy Furnace, Mount Union, Huntingdon county. One stack, 42½ x 10, built in 1837, and rebuilt in 1869; remodeled in 1887; fuel, La-

trobe and Connellsville coke; ores, fossil and Juniata Valley hematite; annual capacity, 15,000 net tons. G. W. R. Swoope and Owen J. Cassady, owners, Newton Hamilton, Mifflin county. Idle.

Powelton Furnaces, Powelton Iron Company, 308 Walnut st., Philadelphia. Furnaces at Saxton, Bedford county. Two stacks: No. 1, 70 x 18, built in 1880-1, and blown in October 16, 1882, has three 70 x 18 Whitwell stoves; No. 2, 71 x 17, built in 1886-7, and blown in November 30, 1889, has three Whitwell stoves, each 60 x 18; fuel, Broad Top coke; ores, $\frac{1}{2}$ native, from the company's mines, and $\frac{1}{2}$ 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 $\frac{1}{16}$ % of an inch per foot. Benjamin F. Archer, President; James H. Atkinson, Secretary and Treasurer. Idle since June, 1890.

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 x 17 and 65 x 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; J. E. Haverstick, Secretary and Treasurer; Alfred W. Sims, Manager.

Valentine (The) Iron Company, Bellefonte, Centre county. One stack, 70 x 15, built in 1887, and blown in in March, 1888; three Whitwell stoves, 50 x 18; fuel, Connellsville coke; ore, hematite from Centre county; annual capacity, 35,000 net tons. Brand, "Nittany." Formerly operated by the Centre Iron Company. J. W. Gephart, President; Robert Valentine, Secretary and Treasurer. *See Rolling Mills.*

Number of coke and mixed anthracite and coke furnaces in the Juniata Valley: 15 stacks.

SHENANGO VALLEY—COKE AND RAW BITUMINOUS COAL.

Claire Furnace Company Limited, Sharpsville, Mercer county. One stack, 75 x 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 x 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; four Whitwell stoves, each 65 x 18, added in 1889; fuel, coke; ore, Lake Superior; specialty, gray forge pig iron; annual capacity, 60,000 net tons. Brand, "Etna." Blowing capacity sufficient to run only one furnace at a time. *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; George D. Devitt, Superintendent. Selling agents, M. A. Hanna & Co., Cleveland, Ohio.

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, 67,000 net tons. Brands, "Neshannock" and "Shenango." William Patterson, President; James A. Crawford, Secretary and Treasurer; W. E. Reis, Manager.

Raney and Berger Iron Company, New Castle, Lawrence county. Two alternate stacks, each 80 x 17: one built in 1872, and put in blast in May, 1872; entirely rebuilt in 1891; and one built in 1889, and put in blast September 6, 1889; fuel, coke; ore, Lake Superior; product, Bessemer, gray forge, and "Norway" foundry pig iron; annual capacity of each stack, 52,000 net tons. Brands, "Norway," "Crown," and "Hecla." L. Raney, President; George B. Berger, Treasurer. Eastern sales agents for "Norway" foundry iron, Henry H. Adams & Co., 80 Broadway, New York.

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, mill pig iron; annual capacity, 55,000 net tons. E. D. Reis, Superintendent, at the furnace. *See Allegheny County Furnaces and Rolling Mills.*

Sharon Furnace, Naylor & Co., lessees, Sharon, Mercer county. One stack, 60 x 13½, built in 1845, and rebuilt in 1882 and 1891; fuel, Connellsville coke; ore, Lake Superior hematite; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Sharon." Norman Hall, Manager.

Sharon Iron Company Limited, Sharon, Mercer county. Two stacks: one, 72 x 15½, built in 1865, and rebuilt in 1887; and one, 72 x 15, built in 1866, and enlarged in 1883; Whitwell stoves; fuel, 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, Bessemer, low-phosphorus, foundry, and gray forge 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; Fannie Furnace, at West Middlesex, 60 x 12½, first put in blast October 13, 1873, and remodeled in 1885; Alice Furnace, at Sharpsville, 60 x 12, built in 1868, put in operation in October, 1868, and remodeled in 1882. Furnaces equipped with iron stoves; fuel, coke; ore, Lake Superior; product, principally Bessemer pig iron; annual capacity of Ella Furnace, 50,000 net tons, of Fannie Furnace, 33,000 tons, and of Alice Furnace, 40,000 tons. Brand, "Wheeler." E. A. Wheeler, Manager. Pickands, Mather & Co., Cleveland, O., proprietors. Number of furnaces in the Shenango Valley: 22 stacks.

ALLEGHENY COUNTY—COKE.

Carrie Furnaces, Carrie Furnace Company, Pittsburgh. Two stacks at Rankin Station, each 80 x 18; one removed from Ohio in 1883, and blown in February 29, 1884; the other built in 1888-9, and blown in July 19, 1889; seven Massicks & Crooke 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, 75 x 14, built in 1859 and rebuilt in 1889-90; three fire-brick stoves; fuel, coke; ores, Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 40,000 net tons. *See Rolling Mills.*

Edgar Thomson Furnaces, Carnegie Brothers & Co. Limited, Bessemer, on Pennsylvania, Baltimore and Ohio, and Pittsburgh and Lake Erie railroads. Branch offices and post-office address, 42-48 Fifth ave., Pittsburgh. Nine stacks, four built by the Edgar Thomson Steel Company Limited and five by Carnegie Brothers & Co. Limited: Furnace A, 65 x 15, built in 1879, has four Siemens-Cowper-Cochrane stoves, each 65 x 15. Furnaces B, 80 x 18, and C, 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 21, 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 90 x 22, built in 1889-90, have seven Cowper stoves, each 79 x 21. Fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, and foreign; product, Bessemer pig iron, spiegeleisen, and ferromanganese. Combined annual capacity, 850,000 net tons. James Gayley, Superintendent. *See Edgar Thomson Steel Works and Duquesne Steel Works.*

Edith Furnace, Oliver Iron and Steel Company, lessee, Pittsburgh. Telegraph address and location of furnace, Allegheny City. One stack, 75 x 16, built in 1882, and put in operation in November, 1882; rebuilt in 1891; three Cowper-Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity, 50,000 net tons. Brand, "Edith." George E. Tener, Manager. *See Shenango Valley Furnaces. See Rolling Mills.*

Eliza Furnaces, Laughlin & Co. Limited, Pittsburgh. Three stacks: one, 75 x 15, built in 1861, and enlarged in 1874 and in 1890; 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. Brand, "Eliza." Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.

Isabella Furnaces, Isabella Furnace Company, Etna. Three stacks: two, each 75 x 20, built in 1872, and supplied with six 70 x 21 Whitwell stoves; and one, 75 x 16, built in 1890; three Kennedy stoves; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; total annual capacity, 240,000 net tons. Hugh Kennedy, Manager.

Lucy Furnaces, Carnegie, Phipps & Co. Limited, Fifty-first st., (branch offices and post-office address, 42-48 Fifth ave.,) Pittsburgh. Built

by Lucy Furnace Company and enlarged by present owners. Two stacks, each 85 x 20: No. 1 first put in blast in May, 1872, and No. 2 first put in blast September 27, 1877; eight fire-brick stoves; ores, Pennsylvania, Lake Superior, and foreign; product, Bessemer, forge, and foundry pig iron; total annual capacity, 175,000 net tons. Brand, "Lucy." James Scott, Superintendent. *See Homestead Steel Works, Upper and Lower Union Mills, and Beaver Falls Mills.*

Monongahela Furnace Company, McKeesport. Two stacks: Furnaces A and B, each 80 x 20, built in 1889-90; Furnace A blown in December 1, 1890, and Furnace B June 1, 1891; seven Cowper-Kennedy stoves; fuel, Connellsville coke; ore, mostly hematite from Lake Superior; product, gray forge, foundry, and Bessemer pig iron; total annual capacity, 180,000 net tons. Brand, "Monongahela." E. C. Converse, President; David W. Hitchcock, Vice-President; C. I. O'Connor, Secretary; Wm. S. Eaton, Treasurer; Horace Crosby, Assistant Treasurer; Wm. B. Schiller, General Manager; T. B. Walker, Superintendent.

Shoenberger Furnaces, Shoenberger, Speer & Co., Pittsburgh. Two stacks: one 75 x 14½ and one 75 x 15½, built in 1865, and rebuilt in 1890; six Massicks & Crooke stoves; fuel, coke; ores, Lake Superior; product, Bessemer, foundry, and gray forge pig iron; total annual capacity, 106,000 net tons.

Soho Furnace, Moorhead-McCleave 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: 26 stacks.

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 and spiegeleisen. The furnaces are equipped with twenty Whitwell stoves. Total annual capacity, 350,000 net tons. 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 380,000 net tons. *See Rolling Mills.*

Cameron Furnace, Emporium, Cameron county. One stack, 75 x 16, built in 1887-8, and blown in in November, 1888; three Siemens-Cowper stoves, each 70 x 18; fuel, coke; annual capacity, 40,000 net tons. Iron-ore and coal mines and coke ovens belong to the property. E. M. Parrott, Receiver, 43 Wall st., New York. Idle.

Charlotte Furnace Company Limited, Scottdale, Westmoreland county. Pittsburgh office, Rooms 402 and 403, Lewis Building. One stack, 65 x 16½, built in 1872-3, and 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. Selling agents, Joan S. Slagle & Co., Pittsburgh.

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks: Furnace No. 1, 77 x 19, built in 1790, and 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; three Whitwell stoves, 60 x 18. Fuel, Connellsville coke; ore, Lake Superior specular, with a small quantity of mill cinder to insure free working; product, mill and foundry pig iron, strong and of dark color; also some Bessemer pig iron; total annual capacity, 100,000 net tons. Harry W. Hazard, President, 224 South Fourth st., Philadelphia; W. C. Harris, Secretary, Bullitt Building, Philadelphia; Frank A. Hill, Superintendent, and C. H. Kimball, Treasurer, 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, ¾ native, running 33 per cent., and ¼ Lake Superior; annual capacity, 12,000 net tons. George R. Sheldon, President; Wm. H. DeForest, Jr., Secretary and Treasurer; R. L. Martin, General Superintendent, Fairchance, Pa.

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, 50,000 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. Idle for several years.

Number of coke furnaces in Western Pennsylvania outside of Allegheny county and the Shenango Valley: 13 stacks.

CHARCOAL.

Berlin Iron Works, 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. F. R. Jackson, proprietor, Berwick; W. J. Bolton, Superintendent, Glen Iron.

Boiling Springs Iron Company, Boiling Springs, Cumberland county. One stack, 30 x 9, built in 1798 by Michael Ege, 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." Company formerly called South Side Iron Company Limited. Furnace formerly known as Carlisle Iron Works. J. C. Bucher and W. A. Mullin, Managers. J. C. Bucher, owner of furnace.

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 sale or 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, magnetite and hematite from the neighborhood; product, charcoal pig iron, warranted strictly cold blast, for car-wheels, chilled rolls, malleable castings, and 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. Idle, but in excellent condition. *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. Idle. *See Rolling Mills. See Bloomeries.*

Falling Spring Furnace, Bonebrake, Burkhart & Co., Chambersburg, Franklin county. 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."

Greenwood Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Works at Greenwood, Huntingdon county. Philadelphia office, 216 South Fourth st. One stack, 46 x 8, built in 1864; remodeled in 1889; cold blast; ore, red fossiliferous, obtained in the vicinity; pig iron used for car-wheels and chilled rolls; annual capacity, 3,600 net tons. *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; product, forge and foundry pig iron; annual capacity, 2,000 net tons. (Old Hecla Furnace, built in 1820, was abandoned in 1864.) *See Rolling Mills. See Bloomaries.*

Isabella Furnace, Joseph D. Potts, Wyebrooke, Chester county. Philadelphia office, 267 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 Elba 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, same county. 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.

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 magnetite 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; equipped for hot blast in 1890; open top; ores, Moselem hematite and local magnetite; product, pig iron for car-wheels and chilled rolls; annual capacity, 3,500 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." Edward B. Wiestling, General Manager, Secretary, and 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; Wm. H. Woodward, Treasurer; S. R. Still, Superintendent. *See Bloomaries.*

Number of charcoal furnaces in Pennsylvania: 15 stacks. Total number of furnaces in Pennsylvania: 219 completed stacks, and 1 stack projected.

MARYLAND.

COKE.

Deborah Furnace, 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; Harry P. Gorsuch, Secretary; George Houck, Treasurer. *See Charcoal Furnaces.*

Maryland Steel Company, Sparrow's Point, Baltimore county. Philadelphia office, 208 South Fourth st. Four stacks: Furnaces A, B, C, and D, each 85 x 22; commenced building in August 1887 and completed in 1889, 1890, and 1891; first stack blown in in November, 1889; each stack equipped with four Whitwell stoves; fuel, coke from West Virginia, the mountain district of Pennsylvania, and Connellsville, Pa.; ores, hematite from Cuba, Spain, and Africa; product, Bessemer pig iron; total annual capacity, 400,000 net tons. *See Rolling Mills.*

Number of coke furnaces in Maryland: 5 stacks.

CHARCOAL.

Isabella Furnace, Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. One stack, 32 x 9, built in 1856; open top; hot blast; steam and water power; ore, local hematite; product, foundry pig iron; annual capacity, 3,300 net tons. Brand, "Isabella." (The old charcoal stack, built in 1775, was torn down in 1890.) *See Coke Furnaces.*

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." C. N. Ellicott, 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 the neighborhood, roasted and crushed before using; pig iron used for car-wheels, guns, flange iron, and shot and shell; annual capacity, 7,000 net tons. Brand, "Muirkirk." Selling agents, Robinson & Orr, Pittsburgh; Arthur W. Howe, Philadelphia; C. L. Peirson & Co., Boston.

Principio Furnaces, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Perryville. Two stacks: No.

1, 35 x 9, first built in 1723, and rebuilt in 1836; No. 2, 60 x 10, built in 1889-90, and blown in August 20, 1890; warm blast; ores, from the company's mines in Baltimore county, Md., and Iron Hill, New Castle county, Del.; specialty, car-wheel pig iron; annual capacity of No. 1, 2,900 net tons; No. 2, 14,000 net tons. Brand, "Principio."

Stickney Iron Company, 11 South Gay st., Baltimore. Furnaces at Canton, Baltimore county. Two stacks: Furnace A, 50 x 9½, built in 1854; rebuilt in 1871; hot blast; Furnace B, 48 x 11, completed and put in blast May 15, 1882; ore, Baltimore carbonate. The pig iron produced is used in the manufacture of 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. Selling agents, Reed, Stickney & Co., Baltimore.

Number of charcoal furnaces in Maryland: 8 stacks. Total number of furnaces in Maryland: 13 stacks.

VIRGINIA.

COKE.

Alleghany Furnace, Alleghany Iron Company, Iron Gate, Alleghany county. New York office, 29 Broadway. Building one stack, 65 x 13; two Massicks & Croke stoves, each 70 x 16; will use New River coke and local brown and fossil ores; product, to be foundry and forge pig iron; annual capacity, 24,000 net tons. Expects to add a third stove in 1892. Brand, "Alleghany." F. C. Dininny, Jr., President, New York; T. C. Jones, Manager, Iron Gate.

Appalachian Steel and Iron Company, Big Stone Gap, Wise county. Building two stacks, Jennie and Polly, each 75 x 18, commenced August 1, 1890; six Whitwell stoves; will use coke made from coal from same vein as Pocahontas, near Big Stone Gap, and local fossil and brown hematite and Cranberry (N. C.) and Gallagher mine ores; product to be low-phosphorus pig iron from the Cranberry and Gallagher ores and standard foundry and American-Scotch pig iron from the fossil and brown hematite ores; total annual capacity, 60,000 net tons. Brand, "A. S. and I." James F. Peters, President; E. J. Bird, Vice-President and General Manager; H. C. McDowell, Secretary; W. A. McDowell, Treasurer. Selling agents, Bacon & Floto, Cincinnati, O.

Bristol Furnace, Bristol Iron and Steel Company, Bristol, Tenn. Philadelphia office, 224 South Fourth st. Furnace at Bristol, but on Virginia side of State line, in Washington county. One stack, 75 x 17, built in 1890-1; first iron made October 24, 1891; three Whitwell stoves; fuel, Pocahontas coke; ores, brown hematite, magnetite, and Gossan from Virginia, Tennessee, and North Carolina; product, high grade foundry pig iron; annual capacity, 50,000 net tons. Brand,

"Bristol." Abraham S. Patterson, President, 330 Walnut st., Philadelphia; Samuel R. Shipley, Vice-President; Justice Cox, Jr., Secretary and Treasurer; Austin Farrell, Manager. Selling agents, Justice Cox, Jr., & Co., 224 South Fourth st., Philadelphia.

Buena Vista Iron Company, Buena Vista, Rockbridge county. Philadelphia office, Bullitt Building. One stack, 70 x 16, built in 1889-90, and blown in December 12, 1890; three Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, foundry pig iron; annual capacity, 40,000 net tons. Brand, "Buena Vista." S. H. Chauvenet, President, Clarence M. Clark, Vice-President, and George F. Baker, Secretary and Treasurer, Philadelphia; F. B. Richards, Manager, Buena Vista. Selling agents, Edmund D. Smith & Co., 208 South Fourth st., Philadelphia.

Covington Iron Company, Covington, Alleghany county. Building one stack, 75 x 18, to be completed early in 1892; three Gordon-Whitwell-Cowper stoves; fuel, coke; annual capacity, 50,000 net tons. Officers of the company not yet appointed.

Crozer Furnaces, Crozer Iron Company, Roanoke, Roanoke county. General office of the President, Secretary, and Treasurer 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 14, 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, 75,000 net tons. Brand, "Crozer." Samuel A. Crozer, President; John P. Crozer, Treasurer; Francis E. Weston, Secretary; M. Fackenthal, General Manager, Roanoke. Selling agents for New York and New England, N. S. Bartlett & Co., 70 Kilby st., Boston, Mass.

Dora Furnace, Pulaski Development Company, Pulaski City, Pulaski county. Building one stack, 75 x 17, begun in 1890 and to be completed by the close of 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite from Cripple Creek; product, to be foundry pig iron; annual capacity, 50,000 net tons. Brand, "Dora." (Also owns Beverly, Eagle, Raven Cliff, and Speedwell charcoal furnaces and Eagle Forge, all in Wythe county, and leased to G. L. Carter.) J. W. Robinson, President; G. L. Carter, Vice-President; L. S. Calfee, Secretary and Treasurer; R. P. Patterson, Manager.

Gem Furnace, Shenandoah Furnace Company, Shenandoah, Page county. One stack, 70 x 16, built in 1882, and first blown in February 8, 1883; remodeled in 1889 and again in 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite, mined on the furnace property; product, foundry and gray forge pig iron; annual capacity, 40,000 net tons. Brand, "Gem." *See Rolling Mills.*

Graham Furnace, Graham Furnace Company, Graham, Tazewell county. Philadelphia office, 330 Walnut st. One stack, 70 x 16, built in 1890;

to be blown in before close of 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, local hematite and Gossan; product, foundry pig iron; annual capacity, 40,000 net tons. Brand, "Graham." Abraham S. Patterson, President; J. H. Dingee, Secretary and Treasurer; Walter Graham, Manager. Selling agents, C. L. Peirson & Co., Boston.

Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. Main office, 9 Cliff st., New York. One stack, 61 x 13½, built in 1881-2 to use charcoal, and first put in blast in March, 1882; rebuilt to use coke in 1887-8, and blown in January 2, 1889; two Whitwell stoves; ores, local brown hematite and limonite; fuel, Pocahontas coke; product, foundry and forge pig iron; annual capacity, 28,000 net tons. George H. Seeley, President; Jordan L. Mott, Vice-President; J. T. Pearson, Secretary and Treasurer; George M. Seeley, General Manager, at the works. Selling agents, George H. Hull & Co., Louisville and New York; E. R. Mann & Co., Philadelphia; 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 in 1889; the other stack, 60 x 16, first put in blast in February, 1881, and enlarged in 1890; fuel, West Virginia coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 36,000 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. A. S. Winslow, President; Frank Lyman, Vice-President; E. A. Low, Treasurer, and A. Aug. Low, Assistant Treasurer, 31 Burling Slip, New York; Henry Merry, General Superintendent.

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 1884; fuel, Pocahontas and New River coke; ores, local brown hematite and magnetite; annual capacity, 14,000 net tons. Louis S. Kite, Secretary and Treasurer, Edgewater Park, N. J.; Edward P. Lee, Agent, Lynchburg. Owned by the Lynchburg Iron Company, Philadelphia.

Max Meadows Iron Company, Max Meadows, Wythe county. Philadelphia office, Bullitt Building. One stack, 75 x 17, built in 1890-1; to be blown in about January 1, 1892; three Whitwell stoves; fuel, Pocahontas coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 45,000 net tons. S. H. Chauvenet, President, Clarence M. Clark, Vice-President, and George F. Baker, Secretary

and Treasurer, Philadelphia; M. H. Maury, Manager. Selling agents, Edmund D. Smith & Co., Philadelphia.

Nannie B. Furnace, Virginia Nail and Iron Works Company, J. P. Williams, Receiver, Lynchburg. Furnace at Reusens, Campbell county, on the Richmond and Alleghany Railroad. One stack, 65 x 12½, 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 12½, built in 1883-4; four Gordon-Whitwell-Cowper stoves; fuel, New River coke; ore, hematite, 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 limonite, from the Cripple Creek region, Va., and Gossan from the Virginia Mining Company's mines; product, high grade foundry pig iron; annual capacity, 50,000 net tons. A. J. Dull, President, Harrisburg, Pa.; E. P. Borden, Vice-President; Abraham S. Patterson, Secretary and Treasurer, Philadelphia; John W. Eckman, General Manager. Selling agents, C. L. Peirson & Co., Boston; Horace L. Brooke, Baltimore; Hall Brothers & Co., Louisville.

Radford-Crane Furnace, Radford-Crane Iron Company, Radford, Montgomery county. Main office, southeast corner Fourth and Walnut sts., Philadelphia. Building one stack, 75 x 18, begun in 1890, and to be completed early in 1892; four Whitwell stoves; will use Pocahontas coke and Virginia hematite ore; product to be foundry pig iron; annual capacity, 55,000 net tons. Brand, "Radford-Crane." H. W. Hazard, President; W. S. Pilling, Secretary and Treasurer.

Roanoke Furnace, Roanoke Iron Company, Roanoke, Roanoke county. One stack, 82 x 16, built in 1890, and blown in December 1, 1890; four Massicks & Crooke stoves; fuel, Pocahontas coke; ores, brown hematite from Botetourt and Roanoke counties and Gossan from Carroll county, Va.; product, foundry and forge pig iron; annual capacity, 30,000 net tons. Brand, "Roanoke." Selling agents, Crocker Brothers, 32 Cliff st., New York. *See Rolling Mills.*

Rockbridge Furnace, Virginia Iron and Railway Company, Goshen Bridge Rockbridge county. One stack, 86 x 18, built in 1882-3; first put in blast May 1, 1883; three Siemens-Cowper-Cochrane stoves; fuel, Connelville and New River coke; ore, brown hematite; product, foundry and forge pig iron; annual capacity, 55,000 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 J. G. Chamberlain, Manager, Goshen Bridge. Selling agents, Chamberlain, Turney & Co., Columbus, Chicago, and St. Louis.

Salem (The) Furnace Company, Salem, Roanoke county. Philadelphia office, Bullitt Building. One stack, 75 x 14½, built in 1889-91, and blown in in October, 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, foundry pig iron; annual capacity, 35,000 net tons. Brand, "Salem." D. B. Strouse, President, and F. E. Bachman, Manager, Salem; S. H. Chauvenet, Vice-President, and George F. Baker, Secretary and Treasurer, Philadelphia. Selling agents, Edmund D. Smith & Co., 208 South Fourth st., Philadelphia. Number of coke furnaces in Virginia: 19 completed stacks, and 6 stacks building.

CHARCOAL.

Carter, G. L., Pulaski City, lessee of four 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; all cold blast; open tops; total annual capacity, 9,000 net tons. Owned by the Pulaski Development Company, of Pulaski City. These furnaces are not likely to be operated until a railroad is built to them. (Wythe Furnace abandoned.) *See Forges.*

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. D. P. Graham, part owner and General Manager. Selling agents, R. C. Hoffman & Co., Baltimore.

Foster's Falls Furnace, Foster's Falls Mining and Manufacturing Company, Foster's Falls, Wythe county. Furnace on the Cripple Creek branch of the 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, Chilhowie, Va.; J. W. Robinson, Secretary and Treasurer, Graham's Forge; J. A. Dyer, Manager. Selling agents, R. C. Hoffman & Co., Baltimore.

Liberty Furnace, Liberty Iron Company, Liberty Furnace P. O., Shenandoah county. Telegraph address, Edinburg. Main office, 415 Drexel Building, Philadelphia. One stack, 55 x 11, built in 1890-1 on site of old stack built in 1821 and torn down in 1890; new stack blown in early in 1891; Durham stove; warm blast; ore, local limonite; product, car-wheel pig iron; annual capacity, about 17,000 net tons. Brand, "Liberty." A new railroad, 3 feet gauge, connects Liberty Furnace with Edinburg, 12 miles distant. (Columbia Furnace torn down in 1890.) R. A. Cook, President; A. J. Hemphill, Secretary;

H. H. Yard, Treasurer. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

Lobdell Car Wheel Company, Wilmington, Delaware. Two stacks: Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built in 1870-4; rebuilt in 1882; cold blast. Company intends improving equipment of furnace before again using it. White Rock Furnace, in Smyth county, 5 miles from Rural Retreat Station, Wythe county, 38 x 8½, built in 1875, and blown in August 9, 1875; one stove erected in 1891; if put in blast in 1892 a larger blowing apparatus will be provided. Ore, local brown hematite; total annual capacity, 7,500 net tons. George G. Lobdell, President; William W. Lobdell, Vice-President; George G. Lobdell, Jr., Secretary and Treasurer; J. H. Wissler, Superintendent, Rural Retreat.

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." Idle for a long time, waiting for an extension of the Norfolk and Western Railroad. Evans R. Dick, President; Saunders Lewis, Jr., 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, but in good condition. Will probably be started up with coke as fuel when a projected railroad reaches the furnace.

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, 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. Selling agents, R. C. Hoffman & Co., Baltimore.

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, Van Buren Furnace P. O., Shenandoah county. Telegraph address, Woodstock. One stack, 37½ x 9, built in 1850, and rebuilt in 1870; hot blast; ore, local hematite; annual capacity, 2,500 net tons. Idle for several years. Owned by Dudley C. Hall, Berlin, Mass.

Number of charcoal furnaces in Virginia: 14 stacks. Total number of furnaces in Virginia: 33 completed stacks, and 6 stacks building.

PROJECTED.

Basic City Mining, Manufacturing, and Land Company, Basic City, Augusta county. Foundation laid in 1890 for one coke stack; work suspended. J. A. Wise, Secretary and Treasurer.

At Front Royal, by the Twin City Iron Company, one charcoal stack, 55 x 10.

WEST VIRGINIA.

COKE.

Belmont Furnace, Belmont Nail Company, Wheeling, Ohio county. One stack, 70 x 16, first blown in September 4, 1875; fuel, Connellsville and West Virginia coke; ore, Lake Superior; specialty, Bessemer pig iron; annual capacity, 46,000 net tons. Brand, "Belmont." N. Riester, Furnace Manager. *See Rolling Mills.*

Irondale Furnace, F. Nemegyei, Independence, Preston county. Telegraph address, Newburg. New York office, 60 New st., care De Billier & Co. 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 ½ limonite and ½ hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 18,000 net tons. Brand, "F. N." For sale.

Riverside Furnace, Riverside Iron Works, Wheeling, Ohio county. Furnace at Benwood, Marshall county. One stack, 75 x 17, built in 1871-2, and first blown in February 14, 1872; remodeled in 1876, and entirely rebuilt in 1889; fuel, Connellsville coke; ores, Missouri, Lake Superior, and foreign; product, Bessemer pig iron; annual capacity, 70,000 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: 4 coke stacks.

KENTUCKY.

COKE AND BITUMINOUS COAL.

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

Licking Furnace, Newport Rolling Mill Company, Newport, Campbell county. One stack, 65 x 16, built in 1859, enlarged in 1869; annual capacity, 17,000 net tons. *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, Lake Superior; fuel, coke; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Norton." *See Rolling Mills.*

Paducah Furnace, Paducah Iron Company, Paducah, McCracken county. One stack, 70 x 14, built in 1889-90; not yet blown in; two Massicks & Crooke 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.

Watts (The) Steel and Iron Syndicate Limited, Middlesborough, Bell county. Two stacks, each 75 x 17, built in 1889-91; not yet blown in; seven Whitwell stoves; fuel, Middlesborough coke; ores, red fossiliferous and brown hematite from Claiborne county, Tenn.; product to be pig iron suitable for conversion into basic open-hearth steel; total annual capacity, 100,000 net tons. Brand, "Watts." *See Rolling Mills and Steel Works.*

Number of bituminous furnaces in Kentucky: 7 stacks.

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.

Grand (The) Rivers Company, Grand Rivers, Livingston county. Financial and business office, Boston, Mass. Two stacks at Grand Rivers: No. 1, or Blood Furnace, and No. 2, or Lawrence Furnace, each 60 x 13½, built in 1890-91, and expected to blow in before the close of 1891; eight Durham pipe stoves; ore, local brown hematite; total annual capacity, 50,000 net tons. Brand, "Grand Rivers." Aretas Blood, President, Manchester, N. H.; Thomas W. Lawson, Vice-President, Boston, Mass.; D. L. Mason, Treasurer; J. M. Searle, Manager. Selling agents, Chamberlain, Turney & Co., Columbus.

Number of charcoal furnaces in Kentucky: 3 stacks. Total number of furnaces in Kentucky: 10 stacks.

PROJECTED.

Cumberland Gap Iron Company, Middlesborough, Bell county. Began building in 1890 one charcoal stack, 60 x 14; work suspended. O. W. Davis, Jr., President and Manager.

TENNESSEE.

COKE.

Carnegie Iron Company, Johnson City, Washington county. Building one stack, 75 x 16; nearly completed; three Whitwell stoves, each 65 x 18; will use Pocahontas coke and Cranberry ore; product to be "special Bessemer" pig iron; annual capacity, 40,000 net tons. J. T. Wilder, President; J. W. Cure, Secretary and Treasurer; H. W. Hargreaves, Superintendent.

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. Julius L. Brown, President, Joseph M. Brown, Vice-President, and Elijah A. Brown, Secretary and Treasurer, Atlanta, Ga.; B. E. Wells, Engineer and Acting General Manager, Chattanooga. *See Rising Fawn Furnace, Ga.*

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 pig 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; seven Whitwell stoves; fuel, coke; 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.

Embreeville Freehold Land, Iron, and Railway Company Limited, Embreeville, Washington county. Telegraph address of furnace, "Nolachucky," Embreeville. Main office, Dashwood House, 9 New Broad st., London, England. Building one stack, (Embreeville No. 1,) 80 x 19, expected to be finished and blown in by the close of 1891; three Cowper-Kennedy stoves, each 75 x 20; fuel, Pocahontas coke; ore, local brown hematite; product, foundry pig iron; estimated annual capacity, 50,000 net tons. Brand, "Embreeville." The Hon. H. R. Brand, President; Lord Cloncurry, Vice-President; Wm. Burdett, Secretary in London; A. L. Estill, Secretary at Embreeville; W. J. Love, Manager and Superintendent.

Gracey-Woodward Iron Company, Clarksville, Montgomery county.

Building one stack, 70 x 17; three Whitwell stoves; fuel, coke; ore, local brown hematite; estimated annual capacity, 40,000 net tons. W. H. Woodward, President; F. P. Gracey, Vice-President; H. G. Woodward, Secretary, Treasurer, and Superintendent.

Rockdale Furnace, King Furnace Company, lessee, Rockdale, Maury county. Main office, Dayton, Ohio. One stack, 55 x 11, built in 1890, and blown in in that year using charcoal as fuel; coke substituted for charcoal early in 1891; two pipe stoves; fuel, Pineville (Ky.) coke; ore, Tennessee brown hematite; product, soft non-shrinking pig iron; annual capacity, 18,000 net tons. Brand, "King." R. N. King, President, and Walter W. Smith, Vice-President, Dayton; Thomas Sharp, Secretary, Nashville, Tenn.; J. H. Short, Superintendent. Selling agents, Chamberlain, Turney & Co., Columbus, Ohio.

Rockwood Furnaces, Roane Iron Company, Rockwood, Roane county. Main office at Chattanooga. Two stacks, 65 x 15 and 65 x 14, built in 1867 and 1872; fuel, coke; total annual capacity, 40,000 net tons. Brand, "Rockwood." H. S. Chamberlain, President; Orion L. Hurlbut, Secretary; Willard Warner, Jr., Superintendent of furnaces.

Southern (The) Iron Company, Nashville, Davidson county. Nashville Furnaces, at West Nashville, same county. Two stacks, each 60 x 12, built in 1887-8, and blown in May 15, 1888; six Gordon-Whitwell-Cowper stoves; fuel, sometimes coke sometimes charcoal; product, foundry pig iron; total annual capacity, 36,000 net tons. Formerly owned by the Nashville Furnace Company. *See Charcoal Furnaces in Tennessee and Alabama. See Rolling Mills and Steel Works in Tennessee.*

Tennessee Coal, Iron, and Railroad Company, Nashville. Four stacks: The Sewanee Furnace, at Cowan, Franklin county, is 75 x 16; first put in blast in June, 1880, and enlarged in 1891; three Whitwell stoves; ores, 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; ten Whitwell stoves; ore, brown hematite from Georgia and hard red fossiliferous from the Inman mines of the company near South Pittsburg; brand, "South Pittsburg." Product, foundry and forge pig iron; fuel, coke, made in the company's ovens at Tracy City and Whitwell; annual capacity, of Sewanee Furnace, 28,000 net tons; of South Pittsburg Furnaces, 135,000 net tons. Thomas C. Platt, President, New York; N. Baxter, Jr., 1st Vice-President, Nashville; T. T. Hillman, 2d Vice-President, Birmingham, Ala.; A. M. Shook, 3d Vice-President and General Manager, Tracy City; James L. Gaines, Assistant General Manager for Tennessee, Nashville; G. B. McCormack, Assistant 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; A. P. Gaines, Superintendent Cowan Division. *See Furnaces in Alabama.*

Number of bituminous coal or coke furnaces in Tennessee: 13 completed stacks, and 3 stacks building.

CHARCOAL.

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. Not in blast since 1885.

Napier Iron Works, Nashville, Davidson county. Furnace at Napier, Lewis county. Building one stack, 60 x 12, to be completed and blown in before the close of 1891; two fire-brick stoves; ore, local brown hematite from furnace property; product to be car-wheel pig iron; annual capacity, 20,000 net tons. Brand, "Napier." E. C. Lewis, President; John Hill Eakin, Secretary and Treasurer.

Southern (The) Iron Company, Nashville, Davidson county. Five stacks: Aetna Furnace, at Aetna, Hickman county, 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." Cumberland Furnace, at Cumberland Furnace P. O., Dickson county, 37 x 9½, built in 1825; hot blast; annual capacity, 4,000 net tons. La Grange Furnace, at Stribling, Stewart county, 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, 15,000 net tons; brand, "La Grange." Warner Furnaces, 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." *See Coke Furnaces. See Charcoal Furnaces in Alabama. See Rolling Mills and Steel Works in Tennessee.*

Number of charcoal furnaces in Tennessee: 6 completed stacks, and 1 stack building. Total number of furnaces in Tennessee: 19 completed stacks, and 4 stacks building.

PROJECTED.

Cardiff Coal and Iron Company, Boyd Ewing, Receiver, Cardiff, Roane county. Began in 1890 to build one coke stack, 75 x 16, to be equipped with three fire-brick stoves. Foundation started; work suspended.

NORTH CAROLINA.

COKE.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 240 South Third st. One stack, 50 x 11, built in 1883-4, and first put in blast April 16, 1884; hot and cold blast; fuel, coke, formerly charcoal; ore, magnetic, mined on the property; product, pig iron of Bessemer quality; annual capacity, 6,000 net tons. Brand, "Cranberry." Frank Firmstone, President; J. S. Wise, Secretary and Treasurer; C. H. Nimson, General Manager.

North Carolina (The) Steel and Iron Company, Greensboro, Guilford county. Building one stack, 70 x 14, to be completed early in 1892; two Ford & Moncur stoves; fuel, Pocahontas coke; ores, local magnetites and hematites; annual capacity, 33,000 net tons. J. A. Odell, President; J. S. Carr, Vice-President; Charles D. Benbow, Secretary and Treasurer; J. D. Kase, General Manager.

Number of furnaces in North Carolina: 1 completed coke stack, and 1 coke stack building.

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, Hall Brothers & Co., Louisville, Ky. *See Bloomaries.*

Rising Fawn Furnace, Walker Coal and Iron Company, Rising Fawn, Dade county. Georgia Mining, Manufacturing, and Investment Company, lessee. One stack, 75 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, 40,000 net tons. Brand, "Rising Fawn." Julius L. Brown, President, Joseph M. Brown, Vice-President, and Elijah A. Brown, Secretary and Treasurer, Atlanta, Ga.; B. E. Wells, Engineer and Acting General Manager, Chattanooga, Tenn. *See Chattanooga Iron Company, Tenn.*

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, and Harper Hamilton, Secretary and Treasurer, Rome, Ga. Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located 8 miles north of Rome. One stack, 60 x 10, built in 1874; annual capacity, 5,000 net tons. Idle since 1884.

Rome Furnace, The Rome Iron Company, Rome, Floyd county. One stack, 65 x 12, built in 1890-1, and blown in in May, 1891; three Whitwell stoves; ore, brown hematite from Polk county, Ga., and Cherokee county, Ala.; product, car-wheel pig iron; annual capacity, 17,000 net tons. Brand, "Rome." L. S. Colyar, President, Treasurer, and Manager; Charles A. Lyerly, Vice-President; E. Shackleford, Secretary. Selling agents, George H. Hull & Co., Louisville, Ky.; Chamberlain, Turney & Co., Columbus, Ohio.

Tallapoosa Furnace, The Georgia-Alabama Investment and Development Company, Tallapoosa, Haralson county. One stack, 60 x 11, built in 1888-9, and blown in in May, 1890; one Player iron stove; closed top; cold and warm blast; ore, local brown hematite; product, car-wheel and foundry pig iron; annual capacity, 15,000 net tons. Brand, "Tallapoosa." Benjamin F. Butler, President; James A. Burns, General Manager; James W. Hyatt, Treasurer.

Number of charcoal furnaces in Georgia: 4 stacks. Total number of furnaces in Georgia: 6 stacks.

ALABAMA.

COKE.

Bay State Furnace Company, Fort Payne, DeKalb county. Began in 1890 the erection of one stack, 65 x 14; partly built; work suspended in 1891; three fire-brick stoves. A. Brown, President; H. B. Hill, Vice-President, Treasurer, and Manager; T. B. Pierie, Secretary.

Cole Furnaces, Alabama Iron and Railway Company, Sheffield, Colbert county. Three stacks, each 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.

DeBardeleben (The) Coal and Iron Company, Bessemer, Jefferson county. Seven stacks in Jefferson county. Five stacks at Bessemer: 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; Nos. 3 and 4, each 75 x 17, built in 1889-90; six Whitwell stoves; No. 5, or Little Belle, 60 x 12, built in 1889-90; three Whitwell stoves. Eureka Furnaces, at Oxmoor, two stacks: No. 1, 75 x 17, completed in July, 1877, and rebuilt and blown in in December, 1885; No. 2, 75 x 17, first blown in in March, 1876, and rebuilt and blown in in Au-

gust, 1886; seven Whitwell stoves. Fuel, Alabama coke; ores, local brown hematite and red fossiliferous; product, foundry pig iron; total annual capacity, 210,000 net tons. Brand, "DeBardeleben." H. F. DeBardeleben, President; David Roberts, Vice-President; Andrew M. Adger, Secretary and Treasurer; L. W. Johns, Superintendent. Selling agents, Henry H. Adams & Co., New York; Matthew Addy & Co., Cincinnati.

Edwards Iron Company, Woodstock, Bibb county. One stack, 70 x 15, first blown in June 10, 1880; remodeled in 1887 and in 1890; ore, local red hematite; product, foundry and mill pig iron; annual capacity, 30,000 net tons. Giles Edwards, President; J. L. Harrell, Secretary and Treasurer; T. J. Edwards, Superintendent.

Fort Payne Furnace Company, Fort Payne, DeKalb county. One stack, 65 x 14, built in 1889-90, and blown in September 3, 1890; 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 mined on the property. J. M. Ford, President; R. W. Gordon, Secretary and Manager.

Gadsden-Alabama Furnace, Gadsden-Alabama Furnace Company, T. H. Aldrich, Receiver, 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 Poca-hontas coke; ores, local red and brown hematite; product, foundry and mill pig iron; annual capacity, 37,000 net tons. Brand, "Etowah."

Lady Ensley Coal, Iron, and Railroad Company, Sheffield, Colbert county. Two stacks, each 75 x 17: Lady Ensley Furnace, built in 1887-9, and first blown in April 25, 1889; and Hattie Ensley Furnace, built in 1887-8; each stack has three Whitwell stoves; fuel, coke from company's ovens at Horse creek, Walker county; ore, brown hematite from company's mines at Russellville; product, foundry and neutral forge pig iron; total annual capacity, 80,000 net tons. Martin Ensley, Vice-President; Thomas D. Radcliffe, Secretary and Treasurer; Walter Moore, General Manager; J. A. Short, Superintendent. Selling agents, Matthew Addy & Co., Cincinnati.

Mary Pratt Furnace, Mary Pratt Furnace Company, Z. L. Nabers, Receiver, 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, local brown and red fossiliferous; annual capacity, 30,000 net tons. Brand, "Mary Pratt."

North Alabama Furnace, Foundry, and Land Company, W. O. Skelton, Assignee, 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. Idle since July 1, 1890, and for sale.

Philadelphia Furnace, Florence Cotton and Iron Company, Florence, Lauderdale county. Main office, 330 Walnut st., Philadelphia. One stack, 75 x 17, commenced by the W. B. Wood Furnace Company in 1887, and completed by the present company in 1890-1; three Whitwell stoves, each 70 x 20; fuel, coke; ore, brown hematite from Lawrence county, Tenn.; product, foundry pig iron; annual capacity, 50,000 net tons. W. H. Gibbons, President, *pro tem.*; James Pollock, Secretary and Treasurer; Daniel King, Manager.

Pioneer Furnaces, Pioneer Mining and Manufacturing Company, Thomas, Jefferson county. Two stacks, each 75 x 17: No. 1 built in 1886-8, and blown in May 15, 1888; No. 2 built in 1889-90, and blown in February 22, 1890; each has four Siemens-Cowper-Cochrane stoves; fuel, Alabama coke; ores, red and brown hematite from company's mines near the furnace; product, foundry pig iron; total annual capacity, 85,000 net tons. Brand, "Pioneer." 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.

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 16, 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 furnaces; product, foundry and mill pig iron; total annual capacity, 175,000 net tons. Thomas Seddon, President; E. W. Rucker, Vice-President; W. L. Sims, Secretary and Treasurer; E. A. Uehling, Furnace Manager. Selling agents, Chamberlain, Turney & Co., Columbus; Henry H. Adams & Co., New York.

Talladega Furnace, Talladega Iron and Steel Company Limited, J. A. Edwards, Receiver, Talladega, Talladega county. One stack, 72 x 18, built in 1889, and blown in October 5, 1889; three Ford & Moncur stoves, each 62 x 26; fuel, Alabama and West Virginia coke; ore, local brown hematite; product, foundry and forge pig iron; annual capacity, 40,000 net tons.

Tennessee Coal, Iron, and Railroad Company, Nashville, Tennessee. Six stacks in Jefferson county, Alabama. Alice Furnaces at Birmingham, two stacks: No. 1, 75 x 15, built in 1879-80, and put in blast November 23, 1880; raised to present height in 1890; three Gordon-Whitwell-Cowper stoves; No. 2, 75 x 18, built in 1883, and put in blast July 24, 1883; 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, red and brown hematite from the company's mines at Hillman, Redding, and Woodstock; product, foundry and mill pig iron; annual capacity of Alice Furnaces, 60,000 net tons; of Ensley Furnaces, 200,000 net tons. G. Hillman, Superintendent of Alice Furnaces; A. E. Barton, Superintendent of Ensley Division. *See Furnaces in Tennessee for a full list of officers.*

Trussville Furnace, Trussville Furnace and Mining Company, Trussville, Jefferson county. One stack, 65 x 16½, built in 1887-9, and 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. R. D. Smith, General Manager. Selling agents, Rogers, Brown & Co., Cincinnati and Philadelphia; Rogers, Brown & Meacham, St. Louis; Rogers, Brown & Merwin, Chicago.

Vanderbilt (The) Steel and Iron Company, Birmingham, Jefferson county. Clara Furnace, one stack, 65 x 14; building commenced February 9, 1890; furnace blown in August 23, 1890; three Massicks & Crooke stoves; fuel, Alabama coke; brown ores and soft and hard red ores from Alabama and Georgia; product, strong low-phosphorus foundry pig iron; annual capacity, 25,000 net tons. Brand, "Vanderbilt." Company intends to enlarge furnace to 65 x 15½. George O. Vanderbilt, President; Carl A. Meissner, Vice-President and Manager; Frederick T. Ackermann, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati; Chamberlain, Turney & Co., St. Louis; Warren, Wood & Co., New York.

Williamson Furnace, Williamson Iron Company, Birmingham, Jefferson county. One stack, 65 x 13½, built in 1886, and first blown in in October, 1886; three Massicks & Crooke 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; H. D. Williamson, Vice-President; J. B. Simpson, Secretary and Treasurer. Selling agents, Chamberlain, Turney & Co., Columbus; George S. Moore & Co., Louisville.

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, "Anniston." T. G. Bush, President; Stephen N. Noble, General Manager; J. W. Stillwell, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati; C. L. Peirson & Co., Boston. *See Woodstock (charcoal) Furnaces.*

Woodward Iron Company, Woodward, Jefferson county. 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 3 miles of the furnace; specialty, foundry pig iron; total annual capacity, 70,000 net tons. Brand, "Woodward." J. H. Woodward, President; L. W. Shaffer, Secretary; Samuel Mathews, Treasurer.

Number of coke furnaces in Alabama: 38 completed stacks, and 1 stack partly built.

CHARCOAL.

Attalla Furnace, The Southern Iron Company, Nashville, Tenn. Furnace at 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." *See Furnaces and Rolling Mills in Tennessee.*

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; returned to the use of charcoal in 1890; ore, brown hematite, mined in the vicinity; annual capacity, 14,000 net tons. *See Rolling Mills.*

Clifton Furnaces, Clifton Iron Company, Ironaton, Talladega county. Two stacks: No. 1, 55 x 12½, completed and blown in April 16, 1885; No. 2, 56 x 13½, built in 1889-90; cold and warm blast; ore, local brown hematite; product, car-wheel and malleable pig iron; total annual capacity, 33,000 net tons. Brand, "Clifton." Frederick Prime, President, Philadelphia; Tom Cobb King, Superintendent, and Paul Roberts, Secretary and Treasurer, 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 blown in February 23, 1890; two Gordon-Whitwell-Cowper stoves; used coke as fuel for a short time; ore, red and brown hematite; estimated annual capacity, 18,000 net tons. Thomas Rutter, President, New York; W. T. Mulligan, Secretary, New Decatur. For lease.

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 red and brown hematite; product, foundry and car-wheel pig iron; annual capacity, 9,000 net tons. Brand, "Stewart." 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., Louisville; Hyatt, Mathews & Gahr, Cincinnati.

Jenifer Furnace, Jenifer Iron Company, Jenifer, Talladega county.

One stack, 55 x 10, built in 1873; remodeled in 1884; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 10,000 net tons. Company proposes to replace present stone stack with an iron stack, 53 x 11. John W. Noble, President, Anniston; George Noble, General Manager, W. D. Fildes, Secretary and Treasurer, and A. E. Noble, Superintendent, Jenifer. Selling agents, Warren, Wood & Co., New York; J. H. Hillman, Pittsburgh; George H. Hull & Co., Louisville.

Langdon Furnace, Langdon Iron Company, lessee, Langdon, Cherokee county. One stack, 46 x 11½, built in 1873, and rebuilt in 1889-90; blown in in May, 1890; one stove; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 13,000 net tons. Brand, "Langdon." Once known as Stonewall Furnace. R. P. Sibley, President and General Manager; George Davison, Secretary; P. D. Langdon, Treasurer. Selling agents, Hosford & Pluemer, Cincinnati.

Piedmont Land and Improvement Company, Piedmont, Calhoun county. Commenced in 1890 the erection of one stack, 60 x 12, with two Gordon-Whitwell-Cowper stoves; work suspended in 1891.

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, J. I. White, Secretary, and F. S. Lightfoot, Treasurer, Fort Wayne, Ind.; J. M. Garvin, Superintendent, Rock Run.

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, Alabama Coal and Iron Company, Shelby, Shelby county. Two stacks, Nos. 1 and 2, each 60 x 14, built in 1863 and 1873; No. 1 rebuilt in 1889; warm blast; ore, brown hematite, obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 40,000 net tons. Brand, "Shelby." Company formerly known as Shelby Iron Company. T. G. Bush, President, Anniston; H. C. Cooper, Secretary, and W. S. Gurnee, Treasurer, New York; E. T. Witherby, Assistant Treasurer, Shelby. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & 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; annual capacity, 15,000 net tons. Brand, "Tecumseh." Idle since October, 1890. P. N. Moore, President; W. C. Amos, Treasurer and General Manager.

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, burned and rebuilt in 1891; hot or cold blast; ore, local brown hematite; product, car-wheel pig iron; total annual capacity, 25,000 net tons. Brand, "Woodstock." *See Woodstock (coke) Furnaces for list of officers.* Number of charcoal furnaces in Alabama: 15 completed stacks, and 1 stack partly built. Total number of furnaces in Alabama: 53 completed stacks, and 2 stacks partly built.

TEXAS.

CHARCOAL.

Jefferson Furnace, The Lone Star Iron Company, Jefferson, Marion county. One stack, 60 x 12, built in 1889-91, and blown in March 15, 1891; two Durham iron stoves; ores, local brown hematite, fossiliferous, and carbonate; product, car-wheel pig iron; annual capacity, 15,000 net tons. Brand, "Lone Star." John A. Kruse, President and Manager; J. H. Cunningham, Vice-President; Edward Atfield, Secretary; Thomas L. Nelson, Treasurer. Selling agents, Cramer & Burt, Chicago, Ill. *See Rolling Mills.*

Old Alcalde Furnace, State of Texas, owner; R. W. Finley, 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. D. T. Jones, Superintendent of furnace.

Star and Crescent Furnace, The Cherokee Iron Manufacturing Company, Rusk, Cherokee county. Furnace near Rusk, in same county. One stack, 60 x 11, built in 1890-1; will probably blow in before close of 1891; iron stoves; brown hematite and black laminated ores; product, car-wheel and foundry pig iron; annual capacity, 20,000 net tons. Brand, "Star and Crescent." Frank Roder, President; E. C. Dickinson, Vice-President; E. S. Maunsell, Secretary and Treasurer; R. A. Barrett, Manager.

Tassie Belle Furnace, The New Birmingham Iron and Improvement Company of Texas, New Birmingham, Cherokee county. One stack, 60 x 11, built in 1889-90, and blown in in November, 1890; two Weimer pipe stoves; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 net tons. Richard L. Coleman, President and General Manager; Samuel D. Mills, Superintendent. Selling agent, W. B. Dennis, 512 Chamber of Commerce, St. Louis. Number of furnaces in Texas: 4 charcoal stacks.

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, Buckeye Furnace Company, Jackson. 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. J. D. Davis, President; T. J. Williams, Secretary. Idle.

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. Leased by Kelly & Franklin to the close of 1891.

Hecla Furnace, Hecla Iron and Mining Company, Ironton, Lawrence county. One iron stack, 53 x 10½, built in 1887-90 to take the place of a stone stack built in 1833; cold blast; ores, local siderite and limonite, calcined in two ovens with wood after being crushed; product, iron for car-wheels, chilled rolls, and machinery; annual capacity, 10,000 net tons. Stops on Sundays. Brand, "Hecla." Albert Campbell, President; Charles Campbell, Secretary and Treasurer; Isaac N. Henry, Furnace Manager. Sales agents, James Collord, Pittsburgh; George S. Moore, Louisville; Bacon, Floto & Co., and Hosford & Pleumer, Cincinnati; L. & R. Wister & Co., Philadelphia; George S. Burgess, Ironton.

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; Lot Davies, Superintendent. Selling agents, Chamberlain, Turney & 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, roasted in two ovens and charged hot; product, No. 1 foundry pig iron; annual capacity, 3,500 net tons. Brand, "Madison." Linn Bentley, Financial Agent and General Superintendent; Andrew Henson, clerk.

Mount Vernon Furnace, The Campbell Iron Company, Campbell, Law-

rence county. Telegraph address, Mount Vernon Furnace. One stack, 32 x 10½, built in 1833; open top; ore, native hematite; product, warm-blast car-wheel pig 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 Cincinnati, Dayton, and Ironton Railroad. Telegraph address, Ironton. Two stacks: Olive Furnace, 40 x 10, built in 1846, and remodeled in 1890; Buckhorn Furnace, 38 x 10, built in 1833, and rebuilt in 1852. Native limestone ore is used in both furnaces; both have open tops; hot or warm blast; product, foundry and car-wheel pig iron; total annual capacity, 8,000 net tons. Brands, "Olive" and "Buckhorn." W. H. McGugin, Superintendent. Selling agents, Hosford & Pleumer, 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 & Co., Louisville. *See Hanging Rock Bituminous Furnaces.*

Scioto Furnace, Crawford & Leonard, Scioto Furnace, Scioto county. One stack, 32 x 10½, built in 1826, and rebuilt in 1844; open top; hot blast; product, car-wheel pig iron; annual capacity, 4,000 net tons. Selling agents, Bacon, Floto & Co., Cincinnati.

Vesuvius Furnace, Ironton Coal and Iron Company, Ironton. 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." *See Hanging Rock Bituminous Furnaces.*

Total number of charcoal furnaces in the Hanging Rock region of Ohio: 12 stacks. 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, raw coal and West Virginia coke; ores, Lake Superior, Missouri, Virginia, and native; product, foundry and forge pig iron; may run on Bessemer pig iron in 1892; annual capacity, 25,000 net tons. *See Rolling Mills.*

Etna Iron Works, Ironton Coal and Iron Company, 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 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. George N. Gray, Agent. *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; J. E. Jones, Secretary; L. T. Murfin, Manager.

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, raw coal and Kanawha and Connelleville coke; 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, E. J. Bird, Jr., & Co., lessees, Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; fuel, raw coal and West Virginia coke; ores, Hanging Rock limestone, Lake Superior hematite, and Kentucky; product, foundry pig iron and neutral gray forge pig iron for special bars and chains; annual capacity, 15,000 net tons. Brand, "Ironton."

Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. Main office, Ironton. One stack, 65 x 13, built in 1889-90, using machinery removed from Waldorf Furnace, W. Va., and blown in in March, 1891; two Gordon-Whitwell-Cowper stoves; ores, native and Lake Superior; fuel, raw coal and West Virginia coke; product foundry pig iron; annual capacity 10,000 net tons. Brand "Lawrence." John Peters, President; Charles Peters, Vice-President; George Peters, Secretary; John Peters, Jr., Manager. Selling agents, Bacon, Floto & Co., Cincinnati.

Milton Furnace, T. J. Morgan, 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.

Sarah Furnace, The Kelly Nail and Iron Company, 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, foundry and forge pig iron; annual capacity, 12,000 net tons. Brand, "Sarah." *See Rolling Mills.*

Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, 54 x 14, built in 1866, and rebuilt in 1879; fuel, ¾ native raw

coal and $\frac{1}{2}$ West Virginia coke; ores, native limonite and block; product, Nos. 1 and 2 silvery gray foundry pig iron; annual capacity, 9,000 net tons. B. Kahn, President; C. O. Brown, Secretary; L. V. Brown, Manager.

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, 52 x 13, built in 1874-5, and remodeled in 1889; ores, local limestone and high-grade Lake Superior; product, "American-Scotch" pig iron; total annual capacity, 25,000 net tons. E. A. Hyde, President; Robert Vierling, Vice-President; J. F. Forsyth, Secretary and Treasurer; J. C. Clutts, General Manager, Wellston. Selling agents, Forsyth, Hyde & Co., 68 Dearborn st., Chicago.

Number of bituminous furnaces in the Hanging Rock region of Ohio: 14 stacks.

MAHONING VALLEY—COKE.

Anna Furnace, The 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 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; Pickands, Mather & Co., Cleveland.

Brier Hill (The) Iron and Coal Company, Youngstown, Mahoning county. Two stacks: Grace Furnace No. 1, 80 x 18, built in 1861, torn down in 1873; rebuilt in 1882; Grace Furnace No. 2, 77 x 18 $\frac{1}{2}$, built in 1890; Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and foundry pig iron; total annual capacity, 150,000 net tons. Brands, "Brier Hill" and "Grace." 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; fuel, Connellsville coke; ore, Lake Superior; product, forge pig iron; total annual capacity, 65,000 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, 75,000 net tons. Brand, "Girard."

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; Cowper-Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, mill pig iron, all used in the company's rolling mill; annual capacity, 65,000 net tons. Thomas H. Pollock, Manager. *See Rolling Mills.*

Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Works at Haselton, now a part of Youngstown. One stack, 75 x 18, built in 1867, and rebuilt in 1880; three Cowper-Kennedy stoves; 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 80,000 net tons. Brand, "Haselton." *See Rolling Mills.*

Himrod Furnaces, Youngstown, Mahoning county. Two stacks, 70 x 15 and 70 x 16, built in 1859 and 1860, and rebuilt in 1876; total annual capacity, 65,000 net tons. H. K. Taylor, Trustee. Idle.

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, The Ohio Iron and Steel Company, Lowellville, Mahoning county. One stack, 75 x 16, built in 1845, rebuilt in 1872, and remodeled in 1883; fuel, Connellsville coke; ores, Lake Superior and native blackband; product, strong neutral foundry pig iron; annual capacity, 60,000 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; F. H. Wick, Treasurer; Robert Bentley, Secretary 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, 76 x 17; original stack built in 1870, enlarged in 1883, and torn down and rebuilt in 1890; entirely new equipment; three fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 80,000 net tons. Brand, "Thomas." J. R. Thomas, Manager.

Tod Furnace, Youngstown Steel Company, Youngstown, Mahoning

county. One stack, 70 x 15, built in 1889, with the machinery formerly at Eagle Furnace, at Youngstown; three Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 60,000 net tons. Formerly known as Tod Furnace No. 2 of Brier Hill Iron and Coal Company. Edward L. Ford, Superintendent. Selling agents, H. G. Dravo, Pittsburgh; John L. Hogan & Co., Philadelphia; Tod, Stambaugh & Co., Cleveland. *See Rolling Mills and Steel Works.*
 Number of furnaces in the Mahoning Valley: 15 coke 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 12½, 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." Idle since 1888; improvements contemplated. F. B. Baird, President; C. R. Baird, Treasurer; F. B. McElhuinie, Secretary.
 Columbus and Hocking Coal and Iron Company, Columbus. New York office, 80 Broadway. Three 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. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12½, 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, silvery pig iron and high silicon iron, the latter branded "Pencost," and containing from 8 to 12 per cent. of silicon; total annual capacity, 80,000 net tons. (Greendale Furnace, also owned by this company, is now leased to the Greendale Furnace Company. Gore Furnace dismantled.) Henry H. Adams, President, 80 Broadway, New York; W. E. C. Coxe, Vice-President, W. J. Redington, Secretary and Treasurer, and V. Ferguson, General Superintendent, Columbus.

Fannie Furnaces, 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." F. S. Wright, owner, Newark, Ohio.

Glasgow Furnace, The King, Gilbert, and Warner Company, Columbus.

Furnace at Moxahala, Perry county. One stack, 70 x 16½, built in 1877-8, and rebuilt in 1887; fuel, Connellsville and New River coke; ore, Lake Superior; product, Bessemer 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; the machinery was formerly used at Kenton Furnace, at Newport, Ky., built in 1869, and dismantled in 1877; fuel, bituminous coal; ores, native and Lake Superior; product, foundry pig iron; annual capacity, 15,000 net tons. Also called Crafts Furnace. (Owned by the Columbus and Hocking Coal and Iron Company, of Columbus.) 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. New York office, 2 Wall st., Room 42. 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 and coke; ores, native, from the company's property, and Lake Superior; product, No. 1 foundry pig iron; total annual capacity, 50,000 net tons. Frank L. Froment, President; George A. Blood, Vice-President; S. M. Stevenson, Secretary and 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.

Number of furnaces in the Hocking Valley: 14, bituminous stacks.

MISCELLANEOUS—BITUMINOUS COAL OR COKE.

Bellaire Nail Works, Bellaire, Belmont county. One stack, 75 x 17, 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, 60,000 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, 35,000 net tons. *See Rolling Mills in West Virginia.*

Cherry Valley Furnace, Cherry Valley Iron Works, Leetonia, Columbiana county. One stack, 75 x 16, built in 1868, and rebuilt in 1883; fuel, coke and raw coal; ores, Lake Superior and native mixed; specialty, "American-Scotch" foundry pig iron; annual capacity, 50,000 net tons. Brand, "Cherry Valley." (The furnace built in 1867 was torn down in 1890, and company expects to erect a new stack.) *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, 72 x 17, built in 1872; remodeled in 1882-3 and in 1890-1; three Ford & Moncur stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 55,000 net tons. Brand, "Emma." Selling agents, The Condit-Fuller Company, Cleveland. *See Rolling Mills.*

Franklin Furnace, The King, Gilbert, and Warner Company, lessee, Columbus, Franklin county. One stack, 70 x 16, completed in November, 1873; rebuilt in 1884, 1886, and 1890; fuel, Connellsville and New River coke; ore, Lake Superior; product, strong foundry and Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Franklin." *See Glasgow Furnace, Hocking Valley. See Rolling Mills.*

Jefferson Iron Works, Steubenville, Jefferson county. One stack, 80 x 18, built in 1865, and rebuilt in 1889; four Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 60,000 net tons. Brand, "Jefferson." (One stack torn down in 1890.) *See Rolling Mills.*

Mingo Furnaces, Junction Iron Company, Wheeling, W. Va. Furnaces at Mingo Junction, Jefferson county. Two stacks: No. 1, 75 x 17, built in 1871, and rebuilt in 1886; No. 2, 75 x 17, built in 1872, and rebuilt in 1886; four Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity of each furnace, 85,000 net tons. Have sufficient machinery to operate only one furnace at a time. *See Rolling Mills.*

River Furnace, Pickands, Mather & Co., lessees, Cleveland, Cuyahoga

county. One stack, 70 x 17, built in 1879, and remodeled in 1889; iron stoves; fuel, coke; ore, Lake Superior; product, high-grade foundry pig iron; annual capacity, 40,000 net tons. Formerly called Proton Furnace. Owned by the Cleveland Iron Company. (One stack, built in 1869, torn down in 1889.) S. S. Hartranft, Superintendent.

Seneca Furnaces, McKeefrey & Co., 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; annual capacity, 60,000 net tons.

Steubenville Furnace, Riverside Iron Works, Wheeling, W. Va. Furnace at Steubenville, Jefferson county. One stack, 75 x 16, built in 1872, and rebuilt in 1886 and 1890; three Massicks & Crooke stoves; fuel, Connellsville coke; ores, Missouri, Lake Superior, and foreign; product, Bessemer pig iron; annual capacity, 70,000 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; ore, Lake Superior; 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: 17 stacks. Total number of furnaces in Ohio: 72 stacks.

INDIANA.

BITUMINOUS BLOCK COAL AND COKE.

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 and coke; ores, Lake Superior and Iron Mountain; specialty, forge pig iron; annual capacity, 10,000 net tons. Brand, "Brazil." *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." 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. Owners, Solon Humphreys and Amos Cotting, New York, and John W. Harrison, St. Louis.

Calumet Furnace, Chicago Furnace Company, lessee, Rookery Build-

ing, Chicago. Works at Cummings, Cook county. One stack, 75 x 18, built in 1880; one Massicks & Crooke and three Siemens-Cowper-Cochrane stoves; fuel, Connellsville coke; ores, Lake Superior and Menominee; product, Bessemer, foundry, and mill pig iron; annual capacity, 50,000 net tons. Brand, "Calumet." Wm. B. Howard, President; H. A. Howard, Vice-President; Irving T. Hartz, Secretary and Treasurer. Owned by the Calumet Iron and Steel Company, Rookery Building, Chicago.

Illinois Steel Company, Rookery Building, Chicago, Cook county. Seventeen stacks in Illinois: North works, located at Chicago, on north branch of Chicago river, at the foot of Wabansia avenue, have two stacks, Nos. 1 and 2, each 66 x 15½, built in 1869; six fire-brick stoves of various types; product, chiefly spiegeleisen and foundry pig iron; annual capacity, 110,000 net tons. South Works, located at South Chicago, have eight stacks, Nos. 1, 2, 3, and 4, each 75 x 20, built in 1880-1; twelve Whitwell stoves; product, Bessemer pig iron; annual capacity, 325,000 net tons; and Nos. 5, 6, 7, and 8, each 80 x 21, built in 1890-1; sixteen Massicks & Crooke stoves; product, Bessemer pig iron; annual capacity, 355,000 net tons. Joliet Works, at Joliet, Will county, have three stacks, each 80 x 20, Nos. 1 and 2 built in 1873, and rebuilt in 1891, and No. 3 built in 1889-90; product, Bessemer pig iron; annual capacity, 243,000 net tons. Union Works, located at Chicago, on south branch of Chicago river, at Ashland ave. and Thirty-first st., have four stacks, Nos. 1 and 2, each 72 x 14, built in 1869, and rebuilt in 1885, and Nos. 3 and 4, each 73 x 15½, built in 1881, and rebuilt in 1889; two Siemens-Cowper, two Siemens-Cowper-Kennedy, and eight Siemens-Cowper-Foote stoves; product, spiegeleisen, ferromanganese, and Bessemer pig iron; annual capacity, 207,000 net tons. Total annual capacity of all the furnaces, 1,240,000 net tons; fuel, Connellsville coke; ores, Lake Superior, Gogebic, and Minnesota for Bessemer pig iron, and foreign, Southern, and Western for spiegeleisen and ferromanganese. *See Furnaces in Wisconsin. See Rolling Mills in Illinois and Wisconsin.*

Iroquois Furnace, The Iroquois Furnace Company, Rookery Building, Chicago. Furnace at Ninety-fifth st., South Chicago, Cook county. One stack, 80 x 17, built in 1890-1, and blown in September 21, 1891; three Cowper-Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 60,000 net tons. Brands, "Iroquois" for strong iron and "Sterling Scotch" for soft iron. Hay Walker, Jr., President, and T. H. Given, Treasurer, Pittsburgh; Charles F. Forster, Secretary and General Manager, and Wm. Todd, General Sales Agent, Rookery Building, Chicago; F. M. Kernan, Superintendent, South Chicago. Selling agents, Himrod & Co. and W. W. Backman, Chicago.

Number of furnaces in Illinois: 20 coke stacks.

MICHIGAN.

CHARCOAL.

Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. Two stacks, each 48 x 10; one put in blast December 25, 1882, burned May 29, 1883, and rebuilt; the other, built in 1887-8, and blown in in April, 1888; hot blast; charcoal supplied by 104 round brick kilns of an average capacity of 65 cords; wood cut from company's land; ore, Lake Superior; product, car-wheel and malleable pig iron; total annual capacity, 50,000 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.

Carp Furnace, Carp River Furnace Company, Detroit. Furnace at Marquette, Marquette county. One stack, 47 x 10, built in 1872-3, burned in 1882, and rebuilt in 1889-90; two iron stoves; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 12,000 net tons. Brand, "Carp." H. A. Burt, President; Theo. H. Eaton, Vice-President; Solon Burt, Secretary and Treasurer.

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, 50 x 11½, 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, 58 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, 70 net tons. The charcoal for this furnace is made in 20 round and 25 rectangular brick kilns, holding, respectively, 60 and 100 cords each; chemical works are connected with them. Brand, "Elk Rapids." N. K. Fairbank, President, Chicago; H. H. Noble, Vice-President and General Manager, and E. S. Noble, Secretary and Treasurer, Elk Rapids. Iron sold direct from furnace.

Eureka Furnace, Eureka Iron and Steel Works, Detroit. Furnace at Wyandotte, Wayne county. One stack, 55 x 11, built in 1855, rebuilt in 1884-5, and remodeled since; hot blast; ores, Lake Superior and Menominee; product, car-wheel and malleable pig iron; total annual capacity, 25,000 net tons. (One stack, built in 1863, has not been in blast since 1885, and will probably not run again.) John Desmond, Superintendent of furnaces. Selling agents, M. A. Hanna & Co., Cleveland. *See Rolling Mills.*

Excelsior Furnace, Excelsior Furnace Company, Marquette. Furnace at Ishpeming, Marquette county. One stack, 50 x 10, built in 1872, burned and rebuilt in 1880, and again rebuilt in 1890; two iron stoves; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 10,000 net tons. Brand, "Excelsior." Hiram A. Burt, President; C. H. Schaffer, Vice-President; Peter W. Phelps, Secretary; Peter White, Treasurer and selling agent.

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 hematite; pig iron specially adapted for malleable castings; annual capacity, 13,000 net tons. Brand, "G. I. Co. DET." 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 since 1888, 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 for several years, 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, St. Ignace.

Newberry Furnace Company, Newberry, Luce county. Furnace and

general office at Newberry. One stack, 53 x 12, built in 1882-3, and blown in in May, 1883; four iron stoves; water jackets; closed top, with patent charger; ores, hard and soft Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 26,000 net tons. Brand, "Vulcan." The charcoal is made at the furnace in 64 kilns, chemical works being connected with them. Hugh McMillan, President, W. C. McMillan, Vice-President, W. K. Anderson, Treasurer, and A. Evans, Jr., Superintendent, Detroit; Claude W. Case, Secretary and Manager, Newberry. Selling agents, William F. Jarvis & Co., Detroit.

Northern Furnace Company, Marquette, Marquette county. Furnace at Chocolay, Marquette county; post-office address, Harvey. One stack, 50 x 10½, built in 1860, and rebuilt in 1890; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 18,000 net tons. Brand, "Northern." J. M. Longyear, President; N. M. Kaufman, Vice-President; J. G. Reynolds, Secretary; J. M. Wilkinson, Treasurer; R. A. Jones, Superintendent. Selling agents, M. A. Hanna & Co., Cleveland; Charles Himrod & Co., Chicago.

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. 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." Wm. G. Mather, President and Treasurer, J. H. Sheadle, Secretary, and Fred. A. Morse, Auditor, Mercantile Bank Building, Cleveland; M. A. Gibbs, Agent, Negaunee. Selling agents, Pickands, Mather & Co., Cleveland; Pickands, Brown & Co., Chicago.

Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 56 x 11, built in 1879-80, and remodeled in 1891; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 32,000 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, 46 x 10, built in 1871-2, and blown in in July, 1872; warm blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; annual capacity, 15,000 net tons. Brand, "U. I. Co., Det." Austin Burt, President; Wm. Gerhauser, Secretary, Treasurer, and Manager; W. C. Burt, Assistant Secretary and Treasurer.

Weston Furnace, Weston Furnace Company, Manistique, Schoolcraft county. Chicago office, Rookery Building. One stack, 60 x 12, built in 1890-1, and blown in March 4, 1891; two iron stoves; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 25,000 net tons. Brand, "Weston." R. M. Cherrie, President; W. H. Hill, Vice-President; H. Duvall, Secretary; J. D. Mersereau, Treasurer.

Number of furnaces in Michigan: 23 charcoal stacks.

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, 15,000 net tons. E. A. Hyde, President; J. F. Forsyth, Treasurer; W. H. Nelson, Secretary and Manager. Selling 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, 45,000 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. Cairns, Vice-President; George H. Rust, Treasurer; Charles

F. Fairfield, Secretary ; Horace E. Burt, Manager. Selling agents, Forsyth, Hyde & Co., Chicago.

National Furnace, National Furnace Company, De Pere, 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 De Pere, 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." G. W. Andrews, President ; H. C. Gridley, Secretary ; J. C. O'Gorman, Treasurer. Selling agents, Forsyth, Hyde & Co., Chicago.

Number of charcoal furnaces in Wisconsin : 6 stacks.

COKE.

Illinois Steel Company, Rookery Building, Chicago, Ill., and New Insurance Building, Milwaukee. Milwaukee Works, located at Bay View, Milwaukee, Milwaukee county : Two stacks, Nos. 1 and 2, each 66 x 15½, built in 1870-1 ; six Massicks & Crooke stoves ; fuel, Connellsville coke ; ores, Lake Superior, Gogebic, and Iron Ridge ; product, mainly foundry and mill pig iron ; annual capacity, 110,000 net tons. *See Furnaces in Illinois. See Rolling Mills in Illinois and Wisconsin.*

Mayville Furnace, The Northwestern Iron Company, New Insurance Building, Milwaukee. Furnace at Mayville, Dodge county. One stack, 67 x 14, built in 1848 as a charcoal furnace, rebuilt in 1872 and 1884, and remodeled and enlarged in 1887 to use coke ; fuel, Connellsville coke ; ores, Menominee, Gogebic, and local ; product, Bessemer, foundry, and mill pig iron ; annual capacity, 37,000 net tons. Irving M. Bean, President ; J. C. Spencer, Vice-President ; Chas. F. Ilsley, Secretary and Treasurer ; Chas. A. Grimes, Superintendent.

Minerva Furnace, Forsyth, Hyde & Co., lessees, 68 Dearborn st., Chicago. Furnace at Milwaukee. One stack, 56 x 14½, built and put in blast in the summer of 1873 ; three iron stoves ; fuel, Connellsville coke ; ore, Lake Superior ; product, foundry pig iron ; annual capacity, 30,000 net tons. Brand, "Minerva." W. H. Nelson, Superintendent. Sales agents, Forsyth, Hyde & Co., Chicago.

West Superior Iron and Steel Company, West Superior, Douglas county.

The erection of one stack, 80 x 18, begun in 1889; four fire-brick stoves; work suspended in order to facilitate work on steel plant. *See Rolling Mills and Steel Works.*

Number of coke furnaces in Wisconsin: 4 completed stacks, and 1 stack partly built. Total number of furnaces in Wisconsin: 10 completed stacks, and 1 stack partly built.

MINNESOTA.

COKE.

West Duluth Furnace Company, lessee, Rookery Building, Chicago. Furnace at West Duluth, St. Louis county. One stack, 75 x 16, built in 1889-90; three Gordon-Whitwell-Cowper stoves; fuel, coke, made principally at Duluth from Connellsville coal; ore, Vermilion and Gogebic; product, principally Bessemer pig iron; annual capacity, 50,000 net tons. Brand, "Duluth." Charles Himrod, President; John Crerar, Vice-President; R. Floyd Clinch, Secretary; Kirk Himrod, Treasurer; A. S. Bertolet, General Manager. Owned by the Duluth Iron and Steel Company.

Number of furnaces in Minnesota: 1 coke stack.

MISSOURI.

COKE.

Jupiter Iron Works, Jupiter Furnace Company, lessee, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873, blown in for the first time in 1880, and remodeled in 1887; three Gordon-Whitwell-Cowper stoves; fuel, coke; ores, Iron Mountain, Pilot Knob, and about $\frac{1}{4}$ red hematite; annual capacity, 50,000 net tons. W. O. Garrison, Secretary.

Missouri Furnaces, The Missouri Furnace Company, 204 North Third st., St. Louis. Two stacks, each 56 x 15, built in 1870, and remodeled in 1887; one Massicks & Crooke and two Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ores, Iron Mountain 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, E. A. Hitchcock, Receiver, 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; total annual capacity, 75,000 net tons. *See Pilot Knob (charcoal) Furnace. See Rolling Mills.*

Number of coke furnaces in Missouri: 5 stacks.

CHARCOAL.

Midland Furnace, Midland Blast-Furnace Company, 411 Olive st., St. Louis. Furnace at Midland, Crawford county. One stack, 50 x 10, built in 1874-5, and blown in April 10, 1875; rebuilt in 1877; either cold or hot blast; ores, red and brown hematite; product, pig iron for steel purposes; annual capacity, 18,000 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, E. A. Hitchcock, Receiver, 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. Branch office, 411 Olive st., S. Louis. One stack, 55 x 11, built in 1880, and rebuilt in 1891; 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; E. L. Foote, Vice-President, 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, Pueblo, Pueblo county. New York office, 45 and 47 Wall st. Three stacks: one, 75 x 17, built in 1880-1, and blown in September 7, 1881; one, 75 x 18, completed in 1887; and one, 75 x 17, built in 1890-1; ten Siemens-Cowper-Cochrane stoves; fuel, coke, produced at the company's coke ovens at El Moro and Crested Butte; ores, native magnetite and hematite; product, Bessemer, foundry, and mill pig iron, and spiegeleisen; annual capacity, 100,000 net tons. *See Rolling Mills.*

Number of furnaces in Colorado: 3 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; fuel, charcoal, made exclusively

from fir; ore, 35 per cent. brown hematite, worked part raw and part roasted, using a Davis & Colby kiln; product, No. 1 foundry pig iron; annual capacity, 15,000 net tons. Brand, "Oregon." (One stack built in 1866-7 has been abandoned.) Theo. B. Wilcox, President; Martin Winch, Vice-President; J. Frank Watson, Secretary and General Superintendent. Selling agents for California, Falk & Saeger, San Francisco. The company owns and operates a cast-iron pipe foundry at Oswego, which it contemplates enlarging.

Number of furnaces in Oregon: 1 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, made in 20 kilns, each of 75 cords' capacity; 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; A. A. Curtis, Treasurer; A. Halsey, Secretary. Idle since 1889.

Number of furnaces in Washington: 1 charcoal stack.

PROJECTED.

Great Western Iron and Steel Company, Seattle, King county. Works at Kirkland, in the same county. Small foundry, machine, and pattern shops and ore bunkers built, and material and machinery on ground for one coke stack, 75 x 17, to be equipped with three Ford & Moncur stoves. Contemplates making Bessemer pig iron, from local magnetic and hematite ores, for a projected steel plant. L. S. J. Hunt, President; Peter Kirk, Vice-President; W. W. Williams, Secretary; Jacob Furth, Treasurer; H. A. Noble and Peter Kirk, Managing Directors.

UNITED STATES.

Total number of furnaces in the United States in December, 1891, which were then active or might readily be put in blast: 569 stacks. Of these 138 use charcoal as fuel, 164 use anthracite coal or mixed anthracite coal and coke, and 267 use coke or raw bituminous coal. At the same time there were 11 furnaces building, 10 to use coke and 1 to use charcoal. In addition to these there were 10 furnaces which were projected, some of which were partly built and work on them temporarily suspended.

FURNACES ABANDONED OR LIKELY TO BE LONG INACTIVE.

NOTE.—Some of the furnaces named in this list are supplied with fair machinery, and circumstances may at some time favor their revival, but the probabilities are that all the furnaces here mentioned which are not already abandoned will long remain inactive. When companies or individuals are mentioned it is understood that they were the owners at the time the furnaces were first placed in this list.

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. Idle a long time; dismantled in 1891.

CONNECTICUT.

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. Idle for several years.

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

Clove Spring Furnace, Clove Valley P. O., Dutchess county. One stack, built in 1830; dismantled in 1890.

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 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.

Shaparon 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.

Dutchess Furnace, Clove Valley P. O., Dutchess county. One stack, built in 1873 for charcoal and enlarged and changed to anthracite in 1877; dismantled in 1890.

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

Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. No. 1 Furnace, built in 1870; torn down in 1887.

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. Not in blast since 1876. Torn down in 1891 to make room for a new stack.

NEW JERSEY.

Boonton Furnaces, Boonton, Morris county. Two stacks, built in 1848 and 1868, respectively; torn down in 1890. Fuel, anthracite coal.

Chester Furnace, Chester, Morris county. One stack, built in 1878; torn down in 1891. Fuel, anthracite coal and coke.

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

Ringwood Furnace, Hewitt, Passaic county. One unfinished stack.

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. Four 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.

Crane Iron Company, Catasauqua, Lehigh county. One stack, 55 x 18; torn down in 1890.

Dauphin Furnace, Dauphin, Dauphin county. One stack, built in 1854, and remodeled in 1872 for anthracite; burned in 1883.

Donaghmore Furnace, Cornwall, Lebanon county. One stack, built in 1855; abandoned in 1891.

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.

East Penn Furnaces, Lyons Station, Berks county. Two stacks, built in 1874-5; dismantled in 1890.

Frances Furnace, Estate of James S. Marsh, Lewisburg. Furnace at Northumberland. One stack, built in 1872; has long been idle.

Glendon Iron Company, Easton, Northampton county. One stack, No. 4 Furnace, at South Easton, built in 1852; torn down in 1890.

Harrisburg Furnace, Harrisburg, Dauphin county. Formerly called Porter Furnace. Built in 1844, and torn down in 1881.

Kutztown Furnace, Kutztown, Berks county. One stack, 55 x 14½, built in 1875; partly dismantled.

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.

Marietta Furnaces, Marietta, Lancaster county. Two stacks: one, 50 x 12½, built in 1847, and remodeled in 1880; and one, 38 x 12, built in 1849. Idle for a long time.

Marion Furnace, Minersville, Schuylkill county. One stack, first blown

- in September 5, 1873; dismantled in 1891, and part of machinery used in building a furnace at Covington, Va.
- Merion Furnace, Estate of J. B. Moorhead, West Conshohocken, Montgomery county. One stack, built in 1847, enlarged in 1876, and remodeled in 1883; abandoned in 1891.
- 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.
- Philadelphia Furnace, Beach and Vienna sts., Philadelphia. One stack, built in 1873; dismantled in 1890.
- 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.
- Richmond Furnace, Richmond Furnace P. O., Franklin county. One stack, built in 1865, and rebuilt in 1875; part of machinery removed.
- St. Charles Furnace No. 2, Columbia, Lancaster county, formerly known as the Henry Clay. One stack, built in 1845; abandoned in 1889.
- 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 Furnaces, D. O. Hitner, William Penn P. O., Montgomery county. Three stacks, built in 1844, 1845, and 1854; two torn down in 1883, and the other demolished later.
- 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 and 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.
- 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, and enlarged in 1879.
- Fairchance Furnace, Fairchance, Fayette county. One stack, built in 1804, and rebuilt in 1871; dismantled in 1887. Present Fairchance Furnace situated about $1\frac{1}{4}$ miles from this old stack.
- Frankstown Furnace, Frankstown, Blair county. One stack, built in 1836, and rebuilt in 1872; torn down in 1888.
- Glamorgan Furnaces, Lewistown, Mifflin county. Two stacks, one built in 1868 and dismantled in 1885, and one built in 1872, rebuilt in 1884-5, and abandoned in 1890.
- Juniata Furnace, Williamsburg, Blair county. One stack, built in 1857.
- Keel Ridge Furnace, Sharon, Mercer county. One stack, built in 1869; dismantled in 1891.
- Lawrence Furnace, New Castle, Lawrence county. Built in 1846; fuel, coke or charcoal; abandoned in 1873.
- Lemont Furnace, R. Hogsett & Co., Lemont Furnace P. O., Fayette county. One stack, built in 1875, rebuilt in 1885; torn down in 1886. Part of its machinery used in building the 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; dismantled.
- Mount Hickory Furnaces, Sharpsville, Mercer county. Two stacks, built in 1869; torn down in 1886.
- Oliphant Furnace, Fayette Coke and Furnace Company, Oliphant Furnace P. O., Fayette county. One stack, built in 1875-6, and rebuilt in 1886; dismantled in 1891.
- Pennsylvania Furnace, Pennsylvania Furnace P. O., Huntingdon county. One stack, built in 1813; changed from charcoal to coke in 1881. 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. Site now occupied by Ella Furnace.

- 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. Site now occupied by Edith Furnace.
- 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 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 blast 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, 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; idle since 1884.
- 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.
- 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 $\frac{1}{2}$, 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.
- York Furnace, in York county. One stack, built in 1830; made its last blast in 1874.

MARYLAND.

BITUMINOUS COAL AND COKE.

- Antietam Iron Works, near Sharpsburgh, Washington county. One stack, built in 1845; idle since 1883 and dismantled in 1891. This was the third stack built on this site; the first one was built about 1775.
- Bowery Furnace, Cumberland Coal and Iron Company, Frostburg, Al-

- legghany 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 P. O., 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 Longacoming Furnace.

CHARCOAL.

- Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. One stack, built in 1775; torn down in 1890.
- 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. One stack, built in 1836.
- Laurel Furnace, Locust Point, Baltimore. One stack, built in 1846, and rebuilt in 1856, 1873, and 1882; torn down in 1890.
- Locust Grove Furnace, Furstenburg & Adler, Rossville, Baltimore county. One stack, built in 1849; dismantled in 1889.

MIXED ANTHRACITE AND COKE.

- Ashland Furnaces, at Ashland, Baltimore county. Three stacks: Nos. 1 and 2, each 32 x 12, built in 1844; No. 3, 53 x 15, built in 1870. Owned by the Ashland Iron Company, Baltimore.
- 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, and rebuilt in 1878.
- Buffalo Gap Furnaces, Buffalo Gap, Augusta county. Two stacks, built in 1869 and 1873; not in blast for many 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, 5 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, Shenandoah, Page county. Two stacks, built in 1836 and 1857; dismantled.

Cave Hill Furnace, Wytheville, Wythe county. One stack, 47 x 10, built in 1881-2. Owned by S. R. Sayers, Robert Sayers, and George W. Palmer.

Columbia Furnace, Columbia Furnace P. O., Shenandoah county. One stack, built in 1809, and rebuilt in 1829; torn down in 1890.

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, Craig county. One stack, built in 1850, and rebuilt in 1873.

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

Liberty Furnace, Liberty Furnace P. O., Shenandoah county. One stack, built in 1821; torn down in 1890 to make room for a new stack.

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.

Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace P. O., Botetourt county. One stack, 32 x 10, built in 1869; Eugene Kelly, owner, 45 Exchange Place, New York. Idle since 1883.

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.

Walton Furnace, Walton Furnace P. O., Wythe county. One stack, 33 x 8½, built in 1872. Machinery which belonged to the Lobdell Car Wheel Company removed in 1890. Stack and furnace property for sale. Jerome Blair, owner, Walton Furnace.

Wythe Furnace, in Wythe county, 25 x 8, built in 1819, and rebuilt in 1873.

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. 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.

BITUMINOUS COAL OR COKE.

- Bettie Furnace, Black Band Iron and Coal Company, Spring Hill, Kanawha county. One stack, 50 x 10½, built in 1882-3; not in blast since 1886.
- Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1874; idle since 1884.
- 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, and 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.
- Estill Furnace, Red River Iron Works, Estill county. One stack, built in 1831; abandoned and dismantled.
- 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.
- Hunnewell Furnace, Hunnewell, Greenup county. One stack, built in 1852, and rebuilt in 1870; dismantled in 1890.

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.

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, and 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; 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, Knoxville Car Wheel Company, Knoxville. Furnace at Stony Creek, Carter county. One stack, 41 x 9, built in 1880.
- Speedwell Furnace, Speedwell, Claiborne county. 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; idle 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, and remodeled in 1872-3.
- 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.
- Rehoboth Furnace, J. E. Reinhardt, Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810. Idle since 1883. For sale.
- Stonewall Furnace, in Lincoln county. Built during the civil war.
- Vesuvius Furnace, in Lincoln county. Built in 1780; in operation down to 1873.

GEORGIA.

CHARCOAL.

- Diamond Furnace, Cartersville, Bartow county. One stack, built in 1856. Ran on spiegeleisen and ferromanganese 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 building one charcoal stack in 1887; company failed, and furnace not completed.

TEXAS.

CHARCOAL.

Lou-Allen 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, Oreton, 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.
Hecla Furnace, Ironton, Lawrence county. One stone stack, built in 1833; replaced by an iron stack in 1887-90.
Hope Furnace, Hope Furnace P. O., Vinton county. Formerly called Big Sand Furnace. One stack, built in 1854; idle 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 Cross 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.
- Cherry Valley Iron Works, Leetonia, Columbiana county. One stack, built in 1867; torn down in 1890.
- Eagle Furnace, Youngstown, Mahoning county. Built in 1846; dismantled in 1888, and machinery removed to Youngstown by the Brier Hill Iron and Coal Company.
- Eliza Furnace, Wellston, Jackson county. Built in 1877 of material from the abandoned Ophir Furnace; rebuilt in 1881, and remodeled in 1884; dismantled in 1891.
- 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.
- Gore Furnace, Gore, Hocking county. Built in 1876; dismantled in 1889.
- Haselton Furnace, Haselton, Mahoning county. Built in 1868; not now in use.
- Himrod Furnace, Youngstown, Mahoning county. Built in 1868; torn down in 1887.

Jefferson Iron Works, Steubenville, Jefferson county. One stack, built in 1863, and rebuilt in 1877 and 1886; torn down in 1890.

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.

Proton Furnace, Cleveland Iron Company, Cleveland, Cuyahoga county. One stack, built in 1869, and rebuilt in 1878; torn down in 1889.

Tod Furnace No. 1, Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Built in 1846, and rebuilt in 1879; dismantled.

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 P. O., Lawrence county. One stack, built in 1853.

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.

Meier Furnaces, Meier Iron Company, Bessemer Station, near East Carondelet, St. Clair county. Two stacks, built in 1873-5, and blown in for the first time in 1880; dismantled in 1890, and machinery removed to Big Stone Gap, Va.

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; machinery 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.

MICHIGAN.

MIXED ANTHRACITE AND BITUMINOUS COAL.

Grace Furnace, Travers Iron Company, Chicago. Furnace at Marquette. One stack, 63 x 17, built in 1872; fuel, when last in blast, mixed anthracite and bituminous coal. Idle for many years.

CHARCOAL.

Bangor Furnace, Bangor, Van Buren county. First blown in October 29, 1872; dismantled in 1891.

Bay Furnaces, Bay Furnace Company, Onoto, Schoolcraft county. Two stacks, one built in 1870 and 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.

Eureka Furnace, Eureka Iron and Steel Works, Wyandotte, Wayne county. One stack, 45 x 9, built in 1863; formerly known as Ward Furnace; has not been in blast since 1885, and will probably not run again.

Fayette Furnaces, Jackson Iron Company, Cleveland, Ohio. Furnaces at Fayette, Delta county. Two stacks, built in 1867 and 1869, and rebuilt in 1881; dismantled in 1891.

Frankfort Furnaces, South Frankfort, Benzie county. Two stacks, built in 1870 and 1873; idle since 1885, and abandoned.

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

Menominee Furnace, Menominee, Menominee county. Built in 1872-3; idle since 1884, and abandoned.

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, and 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 De Pere, 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, De Pere, 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. One stack, built in 1859.

Knotwell Furnace, Newburg, Phelps county. One stack, built in 1873-4.

Maramec Iron Works, in Phelps county. One stack, built in 1826-9.

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

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

Osage Furnace, in Camden county. Built in 1873.

Scotia Iron Furnace, Leasburg, 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; 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 for a new stack.

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 3 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: 1.

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 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-wheel tires, bar steel, and bar iron. Brand, an Indian head. Aretas Blood, President and Treasurer, Manchester.

Number of rolling mills and open-hearth steel works in New Hampshire: 1.

MASSACHUSETTS.

American Steel Wheel Company, First and I sts., South Boston. General office, 143 Liberty st., New York. Boston office, 180 Summer st. Bessemer steel plant built in 1888; one 3-gross ton converter; first blow made in January, 1889; product, solid steel car-wheels and steel castings; annual capacity, 2,700 net tons. John C. Paul, President and General Manager, and Samuel Garwood, Vice-President and Assistant General Manager, New York; W. W. Whitcomb, Secretary and Treasurer, Boston; W. G. Richards, Superintendent, South Boston.

Bay State Iron Works, Bay State Iron Company, 12 Pearl st., Boston. Works, corner First and I sts., South Boston, Suffolk county. 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 firms, 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, 10 heating furnaces, one air and 2 cupola furnaces, and 7 trains of rolls; steam and water power; product, bar iron, tack plate, sheet copper, and yellow metal sheathing; annual production of rolled iron, about 6,000 net tons. Trustees, John E. Sanford, Luke P. Willard, and Arthur E. Denison. John M. Stetson, Agent of Trustees; Isaac Damon, Superintendent.

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 re-rolled 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; 5 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 6 heating furnaces, 2 busheling and one scrap furnace, 4 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, wagon axles, 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, skelp iron, tack and shovel plate, etc.; annual capacity, 9,000 net tons. 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. Also owns and operates the nail department of the Parker Mills, at Wareham, the nail machines being included above. Horace P. Tobey, Treasurer.

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. Edgar Robinson, owner.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Two mills: Quinsigamond, or South Works; rolling mill built in 1846; 13 heating furnaces and 8 trains of rolls; product, iron and steel wire rods and wire. One 12-gross-ton open-hearth furnace built in 1885, and first steel made September 26, 1885; one 20-gross-ton open-hearth furnace added in 1890. Grove Mill, or North Works, built in 1868; 2 heating furnaces and one train of rolls; product, wire rods for all kinds of wire. Total annual capacity of both works, 100,000 net tons. The company also operates galvanizing, barb wire, and wire rope plants. Wm. E. Rice, President; Charles F. Washburn, Vice-President and Secretary; Philip W. Moen, Treasurer and General Manager. *See Rolling Mills in Illinois.*

Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester, erected in 1864; sixteen 4-pot steel furnaces, 3 heating furnaces, one train of tire rolls, and one hammer; product, crucible steel car-wheel tires used by the company at its works at Hartford; annual capacity, 1,100 net tons. William M. Barnum, President; Salisbury Hyde, Vice-President and Treasurer; Alfred W. Dodd, Secretary.

Worcester Steel Works, The George M. Rice Steel and Iron Company, (being organized) Worcester. 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 10-gross-ton 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, steel rails, wire billets, fish-plates, and merchant steel of all sizes. The works include also a

plant for making steel forgings. Prospective officers: George M. Rice, President; M. J. P. McCafferty, Secretary; Edwin Gleason, Treasurer; William Colles, Manager.

Number of rolling mills and steel works in Massachusetts: 14. Of these 2 make Bessemer steel, 1 makes Clapp-Griffiths steel, 2 make open-hearth steel, and 1 makes crucible steel.

RHODE ISLAND.

Rhode Island Horse Shoe Works, Rhode Island Perkins Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Built in 1867, and rebuilt in 1874; burned January 7, 1887, and rebuilt and running in full June 1, 1887; 7 scrap and 6 heating furnaces, 9 trains of rolls, (six 8 and three 18-inch,) and 28 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," "Perkins' XL Steel Shoes," "Perkins' New Toe-weight Shoe," "Perkins' New Side-weight Shoe," "Perkins' Cow-boy Shoe," etc., and "Perkins' Patent Toe Calks." F. W. Carpenter, President; C. H. Perkins, General Manager; R. W. Comstock, Secretary; Charles R. Stark, Treasurer.

Number of rolling mills in Rhode Island: 1.

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, butt iron, and nuts; annual capacity, 4,000 net tons. S. D. Neal, President; Benjamin S. Porter, Secretary; George B. Finch, Treasurer.

Cold Spring Iron Works, Mitchell Brothers, Norwich, New London county. Built in 1845; 4 heating furnaces and 2 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 thirty 2-pot steel-melting holes; 180 pots can be used at each turn; steam and water 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, and one 24-pot Siemens gas steel-melting furnace; product, crucible steel, rolled and hammered; also rerolls and hammers open-hearth steel; annual capacity, 2,000 net tons. Added in 1883 a spring shop 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, New Haven county. Completed in August, 1871; 7 charcoal forge fires, 6 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and one hammer; uses 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. Pierce N. Welch, President and Treasurer; E. S. Wheeler, Secretary; C. S. Poronto, Superintendent.

Stanley Works Rolling Mill Department, Bridgeport, Fairfield county. The Stanley Works, New Britain, lessee. Built in 1887; 3 heating furnaces and one 12-inch train of rolls for rolling merchant steel. Albert N. Stanton and Edward A. King, Superintendents. (Formerly operated by the Bridgeport Rolling Mill Company.)

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, 4,000 net tons. John Mitchell, President; Frank A. Mitchell, 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; steam and water power; product, rolled and hammered crucible, open-hearth, and Bessemer steel; annual capacity, 6,000 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 1 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."

Buffalo Steel Foundry, Pratt & Letchworth, Buffalo, Erie county. One small open-hearth steel furnace, used in connection with firm's business for the production of castings.

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 street, Brooklyn, Kings county. Built in 1869; 7 heating furnaces, 7 hammers, nine 6-pot 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 and bar iron; specialty, high-grade iron for edge tools, butts, hinges, and boiler flues; annual capacity, 9,000 net tons.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Mill originally built as a rail mill in 1860; puddle mill built in 1868; rail mill converted into puddle mill in 1883; 26 single puddling furnaces, one hammer, and 2 trains of 18-inch rolls. Bar mill erected in 1864; 4 heating furnaces and 4 trains of rolls (one 9, one 12, and one 18-inch, and one 22-inch for 6 x 4 inch and 6 x 6 inch angles.) 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. J. B. Rathbone, President and General Superintendent; Jesse L. Cooley, Secretary and Treasurer. The puddle mill and bar mill are both idle. The plate mill is operated under lease by N. D. Doxey & Co. Entire plant for sale. *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.

Kilmer Manufacturing Company, Newburgh, Orange county. Built in 1890; 2 gas heating furnaces, and 4 trains of rolls (9, 10, 12, and 16-inch); product, wire rods, consumed in the works in the manufacture of wire and fencing; annual capacity, 33,000 net tons. T. S. Kilmer,

- President; I. A. Kilmer, Vice-President; E. E. Kilmer, Secretary; M. D. Kilmer, Treasurer; W. A. Kilmer, Superintendent.
- Manhattan Rolling Mill, John Leonard, 452 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 and rods; annual capacity, 2,000 net tons of horse-shoe iron and 1,000 net tons of flats and rods. Brand for horse-shoe iron, a horse-shoe inclosing the letters "J. L." Benjamin Sheldon, Manager.
- Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Operated by The National Saw Company, 96 and 98 Reade st., New York. 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; Louis Duhme, Vice-President; R. W. Clemson, Secretary; R. L. Woodrough, Treasurer; H. H. Woodrough, Assistant Treasurer.
- Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse, Onondaga county. Built in 1864; 13 heating furnaces, 6 hammers, (from 200 to 2,000 pounds each,) 5 trains of rolls, (two 9, one 10, and two 12-inch,) and 4 steel-cementing furnaces; use Sweet's patent gas furnaces, burning fine coal; manipulate old Bessemer steel rails and locomotive tires, and convert iron into blister steel; product, bar steel, steel crow-bars, seat springs, tire and spring steel, and steel for various other purposes; annual capacity, 17,000 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; Francis H. Nye, Jr., Secretary; Robert Dey, Treasurer; Peter Eckel, Superintendent; M. Cunningham, Purchasing and Sales Agent. Selling 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, part of which is used by the firm in the manufacture of agricultural machinery; annual capacity, 4,500 net tons. T. M. Osborne, President; J. H. Osborne, Secretary; Edwin D. Metcalf, Treasurer.
- Phoenix Horse Shoe Company, Poughkeepsie. New York office, 20 Reade st. Built in 1873; one single puddling furnace, 2 gas and 4 coal heating furnaces, and 5 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 intended for re-

ducing ore by the Conley direct process, producing a raw material for use in the open-hearth furnace. Idle.

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, plow-bolt, horse-shoe, snow-ball horse-shoe, hexagon and beveled-edge tire, screw, hoop, and band iron. Refined 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. W. Stetson, President; George Chahoon, Vice-President; James Rogers, Secretary. *See Forges.*

Sanderson Brothers Steel Company, Syracuse, Onondaga county. Established in 1876; 11 heating furnaces, 3 forge fires, 2 annealing furnaces, 2 steel cementing furnaces, 10 hammers, 3 trains of rolls, (9, 10, and 12-inch,) and one 30-pot and four 12-pot crucible 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, 5,000 net tons. Brand, "Sanderson Bros. & Co." C. H. Halcomb, President and Treasurer; W. F. Belknap, Secretary.

Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn. Rolling mill built in 1891 as an addition to their tin-box establishment; to go into operation early in 1892; 6 heating furnaces, and 6 trains of rolls for hot rolling and 3 trains for cold rolling; product, iron or steel black plates for tinning; estimated annual capacity 5,000 net tons of black plates. *See Tinplate Works.*

Standard Rolling Mills, M. J. Dempsey, Fortieth st. and Eleventh ave., New York City. Built in 1891; 2 heating furnaces and 2 trains of rolls (10 and 18-inch); product, merchant bar and horse-shoe iron; annual capacity, double turn, 6,000 net tons. Brand, "Standard."

Syracuse Steel Foundry Company, 351 West Fayette st., Syracuse. Works at Geddes, Onondaga county. Crucible steel plant built in 1886, and first castings made in November; enlarged in 1887; two 16-pot Sweet's gas steel-melting furnaces. Open-hearth steel plant added in 1890, and enlarged in 1891; first castings made on November 26, 1890; two 10-ton Siemens furnaces. Product of the works, open-hearth and crucible steel castings; annual capacity, 700 net tons of crucible steel and 3,300 net tons of open-hearth steel. 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; 14 single and 7 double 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 15, 1865; 2 converters, each of 10 gross tons' capacity, 4 cupolas, and 2 spiegel cupolas; annual capacity, 300,000 net tons ingots; blooming department contains 6 heating furnaces and an adjustable train of 31½-inch rolls; capacity to roll full product of converting department; steam-power. Henry H. Rogers, President; William Kemp, Vice-President; Selden E. Marvin, Secretary and Treasurer; George A. Bell, Auditor and 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, horse-shoe iron, rounds, squares, hexagons, and fancy shapes of all kinds; annual capacity, 4,000 net tons.

Number of rolling mills and steel works in New York: 23. Of these 1 makes Bessemer steel, 4 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, 5 trains of 22-inch rolls, and one hammer; product, best qualities of sheet iron and sheet steel; annual capacity, 3,000 net tons. Brand, "American R. G." Joseph C. Kent, President; George Danby, Secretary and Treasurer; William Boofman, Superintendent.

Benjamin (The) Atha and Illingworth Company, Newark. (This company was formed June 1, 1891, by the consolidation of Benjamin Atha & Co. and John Illingworth & Co.) Two works: Newark Steel Works, located at Newark, Essex county, began operations in 1864; two 30-pot Siemens melting furnaces, one 7-gross-ton and one 15-ton Siemens open-hearth steel furnace, 12 hammers, and 5 trains of rolls (two 8, one 9, one 12, and one 16-inch). New Jersey Steel Works, located at 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,) 9 hammers, and one 30-pot steel-melting furnace. Product of these works, tool, die, spring, and cutlery steel, open-hearth steel merchant bars, and steel castings; total annual capacity, 30,000 net tons. Brands, "Star Special," "Champion," and "Warranted." Fuel used, coal and petroleum. (The Jersey City Steel Works, at Jersey City, formerly operated by Benjamin Atha & Co., have been abandoned, part of the machinery being removed to the Newark and Harrison works.) Benjamin Atha, President and Treasurer; John Illingworth, Vice-President and Manager; A. C. Denman, Secretary; Robert H. Illingworth, Superintendent.

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton, Morris county. Built originally in 1825 and extended since; 9 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls; water-power; product, bar iron and angles; annual capacity, 12,000 net tons. (Nail department dismantled in 1891.) John Barker, President; Charles Brock, Treasurer. Owned by the Estate of J. Couper Lord, Benjamin Nicoll, Secretary, 68 Wall st., New York.

Columbia Rolling Mill Company, Fourteenth st. and Jersey ave., Jersey City. Built in 1888-9; 6 heating furnaces, 4 annealing furnaces, 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. Telegraph address, Easton, Pa. Built in 1865; 7 double puddling furnaces, 2 heating furnaces, (2 more partly constructed,) 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; annual capacity, 10,000 net tons of muck bar and 20,000 net tons of finished iron. J. L. Barber, Business Manager.

Dover Iron Works, Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770, and rebuilt several times since; 5 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); steam and water power; product, bar iron, boiler rivets, socket bolts, and brace jaws; annual capacity, 6,000 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 street.

Harvey Steel Company, Brills Station, Newark, Essex county. Built in 1889; 5 heating furnaces, one 10-inch train of rolls, 3 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 treats low-grade steel; annual capacity, 3,000 net tons. Brand, "Excelsior." B. G. Clarke, President; Theodore Sturges, Secretary and Treasurer; Joseph H. Dickinson, Manager. Selling agent, Henry A. Bugie, Newark.

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.

John A. Roebling's Sons Company, Trenton. Established in 1852; rolling mill rebuilt in 1873, and again in 1887; now used exclusively for rolling wire rods; it is a modified Garrett mill, and has 2 Siemens gas heating furnaces. In addition to iron and steel wire department the works consist of a wire rope and cable department, a wire-cloth department, a barb-wire and wire-nail department, and a copper wire and insulated wire and cable department. Number of wire-nail machines, 21. Annual capacity for iron, steel, and copper wire, 35,000 net tons, and of rolling mill, 20,000 net tons. Charles G. Roebling, President; F. W. Roebling, Secretary and Treasurer.

Oxford Iron and Nail Company, Oxford, Warren county. New York office, 52 Wall st. Built in 1866; 26 puddling furnaces, 2 reverberatory heating furnaces, one regenerative gas heating furnace, 4 Smith gas producers using anthracite coal, 4 spike furnaces, 103 nail machines, and 4 trains of rolls (one 10, one 12, and two 23-inch); product, iron cut 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, (4 coal and 4 gas,) 9 gas heating furnaces, and 5 trains of rolls, (one 9, one 18, one 22, and one 28-inch, and one 30-inch universal.) Steel department, added in 1889-90, contains two 20-ton open-hearth furnaces, 2 reheating furnaces, blooming mill, shears, and other hydraulic machinery; product, structural material, including beams, channels, angles, tees, merchant bars, universal mill plates, etc.; annual capacity, 15,000 net tons of iron and 15,000 tons of open-hearth steel. The plant includes a bridge-building department, with modern outfit, including steel eye-bar plant; annual capacity of bridge shops, 15,000 net tons. Watts Cooke, President; W. O. Fayerweather, Vice-President and Treasurer; A. C. Fairchild, Secretary; John K. Cooke, Superintendent.

Paterson Iron Company, Paterson, Passaic county. Works built in 1852; rolling mill added in 1883; burned and rebuilt in 1887; one train of two-high 96-inch plate rolls and several hammers; product, plates and heavy forgings. Contemplates removing rolling mill to another locality. Charles D. Beckwith, President; G. A. Beckwith, 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; steam and water 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.

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, three 20, and two 26-inch,) and one 3-ton hammer; product, iron and steel structural

shapes, including beams, channels, angles, tees, and zeos, merchant bars, chains of all sizes, rivets, bolts, etc.; annual capacity, 25,000 net tons. Brand, "Trenton." Works contain a complete plant for the construction of bridges, roofs, and other iron and steel structures. Edward Cooper, President, and Edwin F. Bedell, Secretary, New York; Charles E. Hewitt, Treasurer, and Joseph Stokes, Superintendent, Trenton. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

Trenton Steel Company, Trenton, Mercer county. Built in 1891; one 7-ton open-hearth furnace; to be put in operation early in 1892; product to be cast steel vises. Peter Wilkes, President; Wm. E. Snedeker, Secretary; Samuel K. Wilson, Treasurer.

West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City, Hudson county. Telegraph address, West Bergen. Built in 1880; 17 heating furnaces, 6 trains of rolls, (one 9, one 10, one 12, and one 18-inch, and two 12-inch cold rolling trains,) 6 hammers, and 24 four-pot steel-melting holes; product, crucible cast steel, drawn wire, cold rolled shapes, and sheets; also, reroll Bessemer and open-hearth steel billets; annual capacity, 6,000 net tons.

Number of rolling mills and steel works in New Jersey: 20. Of these 3 make open-hearth steel and 6 make crucible steel.

PENNSYLVANIA.

PHILADELPHIA AND VICINITY.

Bates Steel Company, 705 Walnut st., Philadelphia. Works at Twenty-third and Filbert sts. Built in 1889; 3 cementing furnaces, one reheating furnace, and one 1,100-lb. hammer; product, high-grade steel made by the Bates process from cast and wrought iron and low-grade Bessemer steel. J. F. Bickel, President; F. G. Bates, Vice-President and Manager; Isaac L. Miller, Secretary and Treasurer.

Davis Brothers, Canal st. and Germantown ave., Philadelphia. Built in 1874; one heating furnace, one train of rolls, and 5 spike machines; product, ship, bridge, and wharf spikes, and merchant bar iron; annual capacity, 1,500 net tons. Formerly called Winch's Rolling Mill.

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, 11,000 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; 5 double and 10 single puddling furnaces, one busheling furnace, 5 heating furnaces, and 5 trains of rolls, (two 9, one 17, one 20, and one 22-inch.) Product, bar iron specialties, 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."

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. Thomas Evans, 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 crucible steel-melting furnaces; first rolling mill built in 1866; 2 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 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 train for band saws and a 9-inch guide mill; 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 (The) Steel Company, Nicetown, Philadelphia. This company declines to give a description of its works for publication.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1835 on Tacony creek, 2 miles west of Frankford, and removed to present location in 1849; began making steel in 1845; 5 heating furnaces, 3 trains of rolls, (12, 16, and 18-inch,) one hammer, 2 cementing furnaces, and 16 two-pot crucible steel-melting

furnaces; product, crucible, Bessemer, and open-hearth sheet, machinery, spring, hammer, fork, rake, hoe steel, etc.; reroll Norway iron and nail rods; also manufacture carriage and wagon springs of every description; annual capacity, 4,500 net tons. Edward Rowland, Charles Rowland, and Henry J. Rowland, general partners; Estate of Harvey Rowland, special partner.

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, 6 regenerative gas heating furnaces, 10 coal-fired heating furnaces, 2 regenerative gas pit furnaces, and 6 trains of rolls, (one 12, one 18, two 20, one 23, and one 2-high 36-inch reversing.) Steel converting department added in 1887, and enlarged in 1890-1; one 10-gross-ton, one 20-gross-ton, and one 25-gross-ton open-hearth steel furnace. Forge shop has 5 hammers, (two 2-ton, two 3-ton, and one 20-ton.) Product, iron and 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 $\frac{1}{2}$ inch to 7 inches in diameter, hammered or rolled axles, bar and bridge iron, shafting and steel blooms; annual capacity, 54,000 net tons of finished material. Specialties, structural shapes, axles, shafting, and bar and bridge iron. Brand, "Pencoyd." Bridge and construction department contains equipments for all classes of bridge and architectural work; also standard railroad iron turntables; also hydraulic forge shop for the manufacture of solid forged steel eye-bars from 3 to 8 inches wide; annual capacity, 25,000 net tons.

Penn Treaty Iron Works, Marshall Brothers & Co., Beach and Marlborough sts., Philadelphia. Built in 1856; 8 single puddling furnaces, 6 heating furnaces, and 6 trains of rolls (2 sheet, 2 plate, and 2 tinplate); product, tinplate and sheet and plate iron; annual capacity, 11,500 net tons. Brands, "Penn Treaty" and "Keystone" for sheets and "M. B." for plates. *See Tinplate Works.*

Philadelphia Steel Works, Hallahan, Gross & Frank, South Second st. and Stone House Lane, Philadelphia. Built in 1890-1, and first steel made in 1891; five 2-pot crucible steel-melting holes; product, tool steel; annual capacity, 450 net tons.

Number of rolling mills and steel works in Philadelphia and vicinity:
14. Of these 2 make open-hearth steel, 6 make crucible steel, 1 makes blister steel, and 1 makes special steel.

EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

Allentown (The) Rolling Mills, 237 South Third street, Philadelphia. Two mills at Allentown, Lehigh county: Allentown Rolling Mills, built in 1860; 2 single and 23 double puddling furnaces, 9 heating

furnaces, (7 coal and 2 fuel oil,) 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. Glen Iron Works, 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. J. R. Fell, President; H. W. Allison, Secretary and Treasurer. *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. Open-hearth steel department started August 11, 1888; three completed furnaces, (one 10, one 20, and one 35-gross-ton,) and one 35-gross-ton furnace in course of construction and nearly completed; three oil tempering plants, two for gun and other forgings and one for armor plates; two hydraulic forging presses, one 125-ton hammer, 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-compressed steel. Machine shops, blacksmith shop, and foundry are connected with the works. Petroleum is used for fuel in bloom and rail mill departments. Contracts have been awarded to this company by the United States Government for the manufacture of 9,050 tons of gun forgings, 6,825 tons of armor plates, 100 finished cannon of 8-inch, 10-inch, and 12-inch calibre, etc. Buildings, furnaces, and other necessary appliances and machinery have been erected to supply the requirements of the Government and ship and engine builders, and the company is now furnishing the ship and engine builders of the country with shafting and heavy forgings for the new cruisers and battle ships. Robert P. Linderman, President; Robert H. Sayre, Vice-President and General Manager; John Fritz, Chief Engineer and General Superintendent; Wm. H. Jaques, Ordnance Engineer; R. W. Davenport, Assistant Superintendent; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 16 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 118 nail machines; steam and water power; product, nails and muck bar; annual capacity, 250,000 kegs of nails and 18,000 net tons of muck bar. Brand, "Anchor." Bessemer steel department contains two small tilting converters; first blow made September 21, 1885; idle; annual capacity, 20,000 net tons of ingots. George Brooke, President; Wm. deB. Brusstar, Secretary; George W. Harrison, Treasurer; Elisha Brown, Superintendent. *See Schuylkill Valley Furnaces.*

Blandon Iron and Steel Company, Charles B. Froment, assignee, Blandon, Berks county. New York office, 112 John st. Built in 1867, and enlarged and improved in 1880, 1887, 1890, and 1891; 10 single puddling furnaces, 3 heating furnaces, rotary squeezers, and 3 trains of rolls; product, merchant bars, horse-shoe iron, rods, ovals, half ovals, half rounds, hoops, bands, cotton-ties, grooved skelp, angles, channels, and special shapes; annual capacity, 10,000 net tons. Also rolls all sizes and kinds of soft steel. J. L. Montgomery, President, and Wm. P. Tilton, Treasurer, New York; Charles B. Froment, Vice-President and General Manager, Blandon.

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, machine-flanged heads, 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, and cotton-ties; annual capacity, 10,000 net tons of finished iron. Brand, "Bristol." Charles E. Scheide, President; Gifford V. Lewis, Secretary and Treasurer.

Bryden Horse Shoe Works, Bryden Horse Shoe Company, Catasauqua, Lehigh county. Philadelphia office, 224 South Fourth st. Built in 1888, and put in operation in January, 1889. Rolling mill department, added in 1889-90, contains one heating furnace and one 9-inch train of rolls. Press and forge departments contain 5 heating furnaces, 4 benders, 4 presses, two 1,200-lb. hammers, trimming, clipping, punching, and cleaning machinery. Product, "Boss" and "Bryden" forged horse and mule shoes, made from purchased muck bar; annual capacity, 4,500 net tons. Charles K. Barns, President, Philadelphia; T. F. Frederick, Secretary, Oliver Williams, Treasurer, and Jacob Roberts, Superintendent, Catasauqua.

Carpenter Steel Company, Reading, Berks county. New York office,

Boreel Building, New York. Original plant, containing 8 steel-melting holes, built in 1889, and first steel made in July, 1889. Removed to present site in 1889-90; 6 double puddling furnaces, 3 trains of rolls, (one 7, one 10, and one 16-inch,) 7 hammers, and 24 four-pot steel-melting holes. Product, crucible steel in the form of forgings, armor-piercing projectiles for the Government, and special steel for tools, cutlery, files, etc.; also manipulates Bessemer and open-hearth steel; annual capacity of crucible steel, 7,200 net tons. Brand, "Carpenter's Steel." Works equipped with cold rolling plant and machine shop with 47 lathes. George B. Newton, President; J. C. Barron, Vice-President; J. H. Carpenter, General Manager; Robert W. Hawkesworth, Secretary; L. Gregory, Treasurer.

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 2-high and one 31-inch 3-high plate train,) 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 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, 10,000 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. *See Plymouth Rolling Mill.*

Crum Creek Iron and Steel Company, Chester. Works at Crum Lynne, Delaware county. Built in 1887-8; one double and 4 single puddling

furnaces, 2 heating furnaces, and 2 trains of rolls (12 and 18-inch); product, muck bar, bar iron, and skelp iron; annual capacity, 5,000 net tons. H. B. Birtwell, President and Treasurer; W. L. Birtwell, Secretary; J. Swanger, Superintendent.

Douglassville Iron Company Limited, Douglassville, Berks county. Built as a forge in 1878; rolling mill added in 1887, and enlarged in 1890; 6 double puddling furnaces, one hammer, one rotary squeezer, and one train of rolls; product, muck bar; annual capacity, 7,400 net tons. D. K. Flannery, President and Manager; F. R. Gerhart, Secretary; John H. Egolf, Treasurer.

Easton Sheet Iron Works, Theodore Oliver, Easton, Northampton county. Started February 1, 1872; one single and one double puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and one train of 22-inch rolls; product, bloom and refined sheet iron; annual capacity, 1,000 net tons. Selling agents, Marshall Lefferts & Co., 100 Beekman st., New York.

Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Built in 1884-5; 22 double puddling furnaces, 2 gas heating furnaces, three 22-inch trains of rolls, and 105 nail machines; product, muck bar, nail and tack plate, and "Keystone" iron and steel cut nails; annual capacity, 30,000 net tons of muck bar, 16,000 tons of nail and tack plate, and 300,000 kegs of nails. G. B. Lessig, Chairman; W. S. Ellis, Treasurer; J. B. Lessig, Secretary.

Eureka Cast Steel Company, Chester, Delaware county. Works at Lamokin, one mile south of Chester. Built in 1877. Crucible steel plant added in 1885, and first steel made November 13, 1885; three 4-pot steel-melting holes; annual capacity, 50 net tons of castings. Open-hearth steel plant added in 1891, and first steel made June 25, 1891; one 10-gross-ton open-hearth furnace; annual capacity, 4,800 net tons of castings. The company also produces "Eureka Steel" castings; annual capacity, 700 net tons. Specialty, all forms of railroad and machinery 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; 8 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; first blow made May 11, 1886; one soaking pit;

annual capacity, 50,000 net tons. Product, muck bar, iron and steel bridge, tank, and boiler plate, flanged and dished boiler heads, and buckle plates. Specialties, "Glasgow" marine steel and "Glasgow" extra locomotive steel. Comly B. Shoemaker, President; Richard W. Bailey, Treasurer; L. Fred. Nagle, Secretary. Selling agents, D. F. Cooney, 88 Washington st., New York; Harrington & Robinson, 10 Oliver st., Boston.

Hamburg Rolling Mill, Pottsville Iron and Steel Company, lessee, Pottsville. 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.) Leased puddling department only; annual capacity, 7,000 net tons of muck bar. Owned by the Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. *See Pottsville Rolling Mills. See Schuylkill Valley Furnaces.*

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, drawn into wire and mostly used by the company in the manufacture of barb wire; annual capacity, 35,000 net tons. Fuel used, anthracite coal and oil gas. Charles Douglass, President; C. H. Rowe, Treasurer; C. C. Cluff, Secretary.

Keystone Iron Works Limited, Reading, Berks county. Built in 1857; 6 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, 6,000 net tons. Jacob Snell, Chairman; J. H. Craig, Secretary and Treasurer.

Laurel Iron Works, Coatesville, Chester county. Built in 1825; one annealing furnace, 3 heating furnaces, and 2 trains of rolls; steam and water power; product, flue and tube iron; annual capacity, 6,000 tons. (Formerly operated by Coatesville Iron Works.) Idle and for sale. H. A. DuPont, attorney for owners, 100 Maryland ave., Wilmington, Delaware.

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 Iron and Steel Company, Coatesville, Chester county. Philadelphia office, Bullitt Building. Built in 1810; 3 double puddling furnaces, 9 heating furnaces, (5 reverberatory, 2 Stubblebine, and 2 Siemens,) 4 gas producers, 3 trains of rolls, (one being a 3-high mill with chilled rolls 120 in. x 34 in. and hydraulic automatic tables,) large guillotine shears with knives 110 in. long, and one hammer; steam and water power; product, all kinds of boiler and ship plates, bridge iron, and homogeneous steel plates; also machine flanged boiler heads; annual capacity, 50,000 net tons. The puddle mill, oper-

ated by steam and water power, occupies the site of the mill which first made boiler plates in the United States. Erecting two 15-gross-ton open-hearth furnaces, with hydraulic ladle and ingot cranes, and 8 gas producers. Charles Huston, President; A. F. Huston, Vice-President; Charles L. Huston, General Manager; Robert B. Haines, Jr., Secretary; Joseph Humpton, Treasurer.

McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading, Berks county. 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 steel and iron plates; 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,) one hammer, and 2 butt-welded pipe furnaces, one using petroleum for fuel; product, skelp iron, part of which is made by the firm into butt-welded pipes and the remainder sold; annual capacity, 5,500 net tons.

Norristown Steel Company, Norristown, Montgomery county. Built in 1890-1, and first steel made September 3, 1891; two 15-gross-ton open-hearth steel furnaces; product, open-hearth steel castings of every description and ingots; annual capacity, 3,000 net tons of castings and 3,000 tons of ingots. Erecting plant for the production of iron direct from the ore by the Adams process. S. D. Hawley, President; A. R. Wright, Vice-President; J. Clinton Sellers, Secretary; Charles C. Highley, Treasurer; George J. Humbert, Superintendent.

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 iron and steel boiler plate; annual capacity, 10,000 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; four 15-gross-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 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, J. Wood and Brothers Company, lessee, 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, and plate and sheet steel; annual capacity, 10,500 net tons of muck bar and 9,500 tons of finished material. *See Conshohocken, Pennsylvania, and Corliss Iron Works.*

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, boiler plate, tank, flue, and pipe iron, and muck bar; annual capacity, 10,000 net tons of muck bar and 12,000 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. Philadelphia office, 400 Chestnut st. Built in 1863 and enlarged in 1867; 31 double puddling furnaces, 9 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, 45,000 net tons of muck bar, 2,500 tons of blooms, 50,000 tons of plate iron, and 425,000 kegs of cut 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. Use the basic process, the slag being converted into fertilizing material. 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, Schuylkill county. Old mill built to make rails in 1852, rebuilt and improved since, and altered to make shapes in 1877; 10 double pud-

dling 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 20-gross-ton open-hearth steel furnaces, built in 1890; first cast made in August, 1890; product, billets, blooms, and ingots for own use and for sale; annual capacity, 30,000 net tons. Blooming mill, built in 1887, contains 32-inch rolls for blooming ingots. William Atkins, President; John M. Callen, Secretary. (Clapp-Griffiths converters, built in 1886, torn out in 1890.) Philadelphia office, 226 South Fourth st. *See Hamburg Rolling Mill. See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh & Son, Reading, Berks county. Bolt and nut works started in 1865; rolling mill department organized in 1871; and the whole enlarged in 1872, 1881, and 1886; entire works, except rolling mill, destroyed by fire February 6, 1891, and rebuilt on a larger scale in the same year; 3 heating furnaces and 3 trains of rolls (one 9, one 10, and one 12-inch); petroleum used for fuel in forging department; product, refined merchant bar and bolt iron, and, more especially, bolts, nuts, washers, rivets, rods, and iron for bridges and buildings, 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, 11,000 net tons. Sheet mill built in 1863; 10 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, sheared skelp and plate iron; annual capacity, 16,500 net tons. Also operates three tube works for the production of wrought-iron pipe, boiler tubes, oil-well casing, etc.; annual capacity, 60,000 net tons. Also foundry and machine shop for the production of all classes of rolling-mill and blast-furnace machinery, large castings, cotton compressors, sugar mills, 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. General office, 257 South Fourth st., Philadelphia. Built in 1868 and remodeled in 1889; operated by present company since 1890; 15 double puddling furnaces, 10 heating furnaces, 7 forge fires, and 4 trains of rolls (one 14 and three 23-inch); product, iron and steel structural shapes, including beams, channels, angles, tees, and bars; annual capacity, 40,000 net tons. Formerly called Philadelphia and Reading Rolling Mill. Francis H. Saylor, President; Joseph H.

Cofrode, Vice-President; P. R. Foley, Secretary and Treasurer; J. L. Rake, Manager. Selling agents, J. F. Bailey & Sons, 257 South Fourth st., Philadelphia.

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, 14 heating and 4 grate furnaces, 8 trains of rolls, and one hammer; product, sheet and plate iron and steel; annual capacity, 20,000 net tons. Howard Wood, President; Jona R. Jones, Secretary and Treasurer.

Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Built in 1880-1, and started in March, 1881; 7 double puddling furnaces, 5 heating furnaces, one 4-ton hammer, one rotary squeezer, and three 22-inch trains of rolls; product, boiler plate, boiler-tube skelp, pipe skelp, and puddled bar; annual capacity, 12,000 net tons of plate iron and 10,000 net tons of puddled bar.

Slatington Rolling Mill, Slatington Rolling Mill Company, Slatington, Lehigh county. Built in 1890; 6 single puddling furnaces, one busheling furnace, 2 heating furnaces, and 2 trains of rolls (10 and 16-inch); product, merchant bar iron; annual capacity, 8,400 net tons. David Williams, President; S. DeLong, Secretary; H. F. Hall, Treasurer and Business Manager; Wm. P. Hopkins, Manager.

Standard Steel Casting Company, Thurlow, Delaware county. Telegraph address, Chester. Built in 1883-4, and first put in operation in March, 1884; two 10-gross-ton, one 15-gross-ton, and one 20-gross-ton open-hearth steel furnace; product, open-hearth steel castings. Robert Wetherill, President; Richard Wetherill, Secretary and Treasurer.

Stony Creek Rolling Mill, Norristown, Montgomery county. Built in 1849, and rebuilt in 1879 and 1887; 6 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, grooved and sheared skelp, merchant bars, ovals, half ovals, rounds, and horse-shoe iron; annual capacity, 7,500 net tons. Idle and for sale. Apply to Jas. S. Swartz, 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 bar. Brand, "Thorndale." Charles L. Bailey, President, and Edward Bailey, Vice-President, Harrisburg. Selling agents, Morris, Wheeler & Co., 400 Chestnut st., and Esherick, Cotton & Co., 418 Walnut st., Philadelphia; 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, street rails and railway joints, light T rails, angles, bars, and shapes; annual capacity, 45,000 net tons. C. A. Weed, President and General Manager, Chester; Stephen E. Haas, Secretary and Treasurer, Bullitt Building, 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, iron and steel 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 iron and steel sheets; annual capacity, 15,000 net tons. *See Brandywine Rolling Mills.*

Wellman Iron and Steel Company, (formerly Chester Rolling Mills,) Thurlow, Delaware county. Philadelphia office, 220 South Fourth st. Built in 1874-5; 8 double puddling furnaces, 2 coal and 3 gas heating furnaces, 1 hammer, and 6 trains of rolls (one being a 3-high mill with rolls 132 in. x 34 in., two 2-high mills with rolls 100 in. x 30 in. and 80 in. by 30 in., and one a 3-high mill with rolls 72 in. x 25 in.); product, iron and steel plates; annual capacity, 30,000 net tons. Open-hearth steel plant added in 1881-2, consisting of two 15-gross-ton open-hearth steel furnaces; annual capacity, 22,500 net tons of ingots, mostly worked into plates. Bessemer steel plant added in 1889, consisting of two 3-gross-ton converters and blooming mill; daily capacity, 350 net tons of ingots, worked into wire billets, slabs, and miscellaneous blooms. S. T. Wellman, President; Wm. G. Neilson, Vice-President; J. P. Crozer, Treasurer; R. Peters, Jr., Secretary. *See Schuylkill Valley Furnaces.*

Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 52. Of these 4 make Bessemer steel, 1 makes Clapp-Griffiths steel, 1 makes Robert-Bessemer steel, 8 make open-hearth steel and 1 open-hearth steel plant is being built, 2 make crucible steel, and 2 make special steel.

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 coal puddling furnaces, one double gas puddling furnace, 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, W. H. Godcharles, Towanda, Bradford county. First started in November, 1872; one single and 3 double puddling furnaces, 2 heating furnaces, two 19-inch trains of rolls, and 40 nail machines; product, iron and steel cut nails; annual capacity, 100,000 kegs. Brand, "Bradford County Nail Works."

Central Iron and Steel Works, Harrisburg, Dauphin county. First mill built in 1853; new mill built in 1878; puddle mill contains one single and 7 double puddling furnaces; annual capacity, 10,000 net tons of muck bar; boiler plate mill contains one gas and 6 coal heating furnaces. Entire works have 5 trains of rolls, (one muck, one 25-inch and one 31-inch roughing, one Lauth 3-high 25-inch chilled finishing, with rolls 72 inches long, and one Lauth 3-high 31-inch chilled finishing, with rolls 96 inches long,) with 2 large Morgan guillotine shears, one large circle shear for shearing boiler heads, and other necessary machinery for rolling plates of almost any required size; product, boiler plate and tank iron and boiler plate steel; annual capacity, 25,000 net tons of plates. Charles L. Bailey, President; Edward Bailey, Vice-President; G. M. McCauley, Secretary and Treasurer; John N. Binnix, Superintendent.

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, 260,000 kegs of nails and 12,000 net tons of muck bar. Brand, "Chesapeake." Charles L. Bailey, President; Edward Bailey, Vice-President; John C. Harvey, Secretary and Treasurer.

- 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. Frank A. Bennet, 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; 12 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.*
- Danville Nail Works, Danville, Montour county. Built in 1883, and first nails made August 31, 1883; 3 double puddling furnaces, 2 large heating furnaces, 2 trains of rolls, (18-inch puddle and 3-high 20-inch plate,) and 92 nail machines; product, muck bar and iron and steel nails; annual capacity, 250,000 kegs of nails. Idle and for sale. Apply to L. S. Wintersteen, Bloomsburg.
- Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; 20 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (8, 16, 18, and 20-inch,) and 50 nail machines; product, bar iron and iron and steel nails; annual capacity, 6,000 net tons of bar iron and 125,000 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 1830; 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 Bloomeries.*
- East Lebanon Iron Company, Lebanon, Lebanon county. Built in 1891; 8 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (20-inch muck and 22 x 68-inch plate); product, sheared skelp, tank, stack, chute, and structural plates of iron and steel; annual capacity, 10,000 net tons. H. H. Light, President and Manager; H. O. Nutting, Secretary; Wm. P. Nutting, Treasurer.
- 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; 2 heating furnaces and 2 trains of rolls (10 and 12-inch); product, bar iron, mine-car axles, strap rails, and toe-calk steel; annual capacity, 6,000 net tons. Fuel used, anthracite culm. D. B. Atherton, General Manager; W. B. Borst, Foreman.
- 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, Harrisburg, Dauphin county. Original works built in 1865 to roll rails; 2 single and 12 double 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 T 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; 3 double and 2 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (12 and 16-inch); steam and water power; product, muck bar and bar iron; annual capacity, 6,000 net tons. *See Bloomaries.*

Jackson (The) and Woodin Manufacturing Company, Berwick, Columbia county. Built in 1872; 10 single and 3 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (one 9, one 3-high 16, and one 3-high 18-inch); product, merchant bar iron and forgings; annual capacity, 16,000 net tons. Brand, "Berwick." Also manufactures 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, Hollidaysburg and Gap Iron Works, Joseph Fichtner, Trustee and Receiver, Hollidaysburg. Built in 1866; 15 single puddling furnaces, rotary squeezer, 2 heating furnaces, 3 trains of rolls, and 30 nail machines; product, bar and pipe iron and cut nails and spikes; annual capacity, 8,000 net tons. (Property to be sold December 31, 1891.) *See Gap Furnace.*

Lackawanna Iron and Steel Company, Scranton, Lackawanna county. Two works: North Scranton Works, formerly operated by the Lackawanna Iron and Coal Company, commenced in 1840; 33 heating

furnaces and 10 trains of rolls, (one 12, two 18, two 20, three 23½, and two 36-inch,) and 2 hammers; product, light and heavy railroad steel rails, merchant bars, blooms, and billets; annual capacity, 250,000 net tons of steel rails and 15,000 tons of steel merchant bars and blooms and billets. Bessemer steel plant added in 1875; three 7-gross-ton converters, 6 pig-melting and 3 spiegel cupolas; first blow made October 23, 1875; first rail rolled December 29, 1875; product, ingots for rails, billets, etc.; annual capacity in ingots, 275,000 net tons. South Scranton Works, formerly operated by the Scranton Steel Company, built in 1881-3; two 9-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, 275,000 net tons of ingots and 250,000 net tons of rails. Adding 2 additional heating furnaces. Both works use anthracite culm for fuel under boilers. Brand, "Lackawanna." New York office, 52 Wall st. E. F. Hatfield, President, H. V. Vultee, Secretary, and Theodore Sturges, Treasurer, New York; Edward C. Lynde, Assistant Secretary, and E. S. Moffat, General Manager, Scranton, Pa. *See Upper Susquehanna Furnaces.*

Lebanon Iron Company, Lebanon, Lebanon county. Built in 1882-3; 7 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (20-inch puddle and 8-inch and 12-inch finishing); product, muck bar and refined iron; annual capacity, 15,000 net tons of refined iron. Brands, "Titan," "Titan B," and "Titan BB." 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, Lewisburg Iron and Steel Company, Lewisburg, Union county. Built in 1884, and first put in operation November 10, 1884; 5 double puddling furnaces, one heating furnace, one 18-inch train of rolls, and 41 nail machines. Owned by a committee of bondholders of the company, represented by Alfred Hayes.

Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. Built in 1886-7, and put in operation September 5, 1887; two 3-gross-ton Bessemer steel converters and one 24-inch blooming mill. Product, soft steel billets for boiler, tank, shovel, and nail plate and miscellaneous purposes; annual capacity, 22,000 net tons. Samuel Weiss, President; C. Penrose Sherk, Managing Director; J. L. Rutter, Secretary and Treasurer; Samuel Groh, Superintendent.

Lock Haven Nail Works, Charles M. O'Connor, 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; annual capacity, 50,000 kegs of nails. Idle and not likely to be operated again as a nail works.

Logan Iron and Steel Works, Logan Iron and Steel Company, Lewistown, Mifflin county. Office, 216 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, coupling links and pins, and switch iron. H. T. Townsend, President; S. H. Pitcher, Secretary; R. F. Kennedy, Treasurer; R. H. Lee, Superintendent; R. H. Lee, Jr., Assistant 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 (13½-inch skelp, 16½-inch skelp, and 19-inch puddle and breaking down train); product, skelp iron; annual capacity, 30,000 net tons. Also owns a large machine shop and foundry with a capacity of 250 tons per week. Abraham S. Patterson, President; William C. Frick, Treasurer and General Manager.

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, 2,500 net tons; rod mill, 1,500 net tons. Also operate wire-drawing plant and factory for the manufacture of all kinds of polished and cable chains. *See Charcoal Furnaces. See Bloomeries.*

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 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one muck and one 10-inch bar); also operates bolt and nut factory, with heating furnaces using oil fuel; product, muck bar, bar iron, cold-punched washers, bolts, and hot-pressed nuts; annual capacity of rolled iron, 10,000 net tons. 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 88 nail machines; product, iron and steel cut nails and spikes; annual ca-

capacity, 200,000 kegs. Selling agents, Fuller Brothers & Co., New York.

Milton Rolling Mill and Forge, Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 6 single and 3 double puddling furnaces, one coal and one gas heating furnace, rotary squeezer, and 3 trains of rolls (10, 15, and 18-inch); product, merchant bar iron; annual capacity, 7,800 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; John Jenkins, General Manager; John M. Young, Treasurer; P. C. Johnson, Secretary and Assistant Treasurer. *See Williamsport Iron and Nail Works.*

Montour Iron and Steel Works, Montour Iron and Steel Company, Danville, Montour county. Built in 1845; 20 double puddling furnaces, 15 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. S. P. Wolverton, President, Sunbury; 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 open-hearth steel furnace; annual capacity, 12,000 net tons. Bessemer steel works built in 1887-8; two 4-gross-ton converters, 2 Hainsworth soaking pits, and one 32-inch reversing blooming train; annual capacity, 120,000 net tons of ingots. Rolling mill contains 6 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, light and heavy T and street 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; F. P. Howe, Vice-President and General Manager; Walter S. Massey, Treasurer; Charles M. Griffith, Secretary; R. K. Polk, 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, (18-inch puddle, 8 and 10-inch guide, and 16-inch bar,) 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.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; burned and rebuilt in 1886; 8 double puddling furnaces, 4 coal and one Smith gas heating furnace, and 5 trains of rolls (20-inch puddle, and 8, 10, 12, and 16-inch finishing); product, bar iron, bolts, nuts, washers, etc.; annual capacity, 30,000 net tons. Arthur Brock, President; Edward R. Coleman, Vice-President; James Lord, Secretary and Treasurer; W. B. Middleton, Superintendent.

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 of 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 of 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; one 5-ton furnace added in 1889 and two 15-ton furnaces in 1890; annual capacity, 50,000 net tons of ingots, worked into boiler, structural, and special steels. Merchant mill, erected in 1883, contains one 13 and one 20-inch train of rolls; billet mill, erected in 1887, contains one 20-inch train. There are also machine shops and the necessary repair shops connected with the works. New York office, 2 Wall st.; Boston office, 70 Kilby st. Luther S. Bent, President; E. F. Barker, Vice-President; E. N. Smith, Secretary

and Treasurer; F. W. Wood, General Manager; E. C. Felton, Superintendent; H. H. Campbell, Assistant Superintendent. S. W. Baldwin, sales agent, New York; C. S. Clark, sales agent, Boston. *See Lower Susquehanna Furnaces.*

Portage Iron Company Limited, Duncansville, Blair county. New York office, A. R. Whitney & Co., No. 29 Broadway. Built in 1839, and rebuilt in 1882-3; enlarged in 1890; 37 single puddling furnaces, 6 heating furnaces, and 6 trains of rolls (18 and 20-inch muck, 15-inch bar, 7 and 10-inch hoop, and 8-inch guide); product, iron and steel bars, bands, angles, hoops, and cotton-ties; annual capacity, 25,000 net tons of finished iron and steel. Brand, "Portage." A. R. Whitney, President, J. P. Meday, Vice-President, R. K. Hance, Secretary, and D. A. Nesbitt, Treasurer, 29 Broadway, New York; W. G. Merriman, General Manager, Duncansville.

Rohrerstown Rolling Mill, Rohrerstown, Lancaster county. Enlarged in 1872 and 1890; 7 double puddling furnaces, rotary squeezer, and one train of rolls; product, muck bar; annual capacity, 9,000 net tons. Formerly known as the Franklin Iron Works. Owned by Henry S. Eckert, Reading. For sale.

Safe Harbor Rolling Mill, Safe Harbor, Lancaster county. Built in 1848; one single and 18 double puddling furnaces, 8 heating furnaces, and 2 trains of rolls; product, muck bar. Idle and for sale. Address, David Reeves, 410 Walnut st., Philadelphia.

Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 10 heating furnaces, 4 hammers, (10-ton and 15-ton Tannet & Walker, 7-ton Sellers, and 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; J. P. Stevenson, Superintendent.

Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury, Northumberland county. Built in 1883, and first put in operation in August, 1883; 3 single and 3 double puddling furnaces, one heating furnace, 2 trains of rolls, and 41 cut-nail machines; annual capacity, 120,000 kegs of cut nails. Brand, "Sunbury." J. A. Cake, President; D. Heim, Vice-President; L. T. Rohrbach, Secretary and Treasurer; George B. Cadwallader, General Manager. Idle.

Susquehanna Iron Works, Susquehanna Iron Company, Columbia, Lancaster county. Built in 1860; 13 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 11,000 net tons. William Patton, President and General Manager; J. E. Schall, Secretary and Treasurer.

Taggarts & 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 cut nails. Brand, "Taggarts & Howell's Mills."

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Office, Harrisburg. Forges established in 1809; rolling mill plant added in 1883; 3 regenerative gas heating furnaces and one 16-inch train of rolls; product, charcoal boiler-tube skelp; annual capacity of mill, 12,000 net tons. John Y. Boyd, President; R. C. Neal, Secretary and Treasurer. *See Bloomeries.*

Valentine (The) Iron Company, Bellefonte, Centre county. Built in 1798; 4 double puddling furnaces and one train of rolls; water-power; product, muck bar; annual capacity, 4,500 net tons. J. W. Gephart, President; Robert Valentine, Secretary and Treasurer. *See Juniata Valley Furnaces.*

Watsonstown Nail Works, Watsonstown, 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 of nails. Owned by Watsonstown Planing Mill Company.

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; 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, Milton. Works at Williamsport, Lycoming county. Built in 1873-4; 5 double puddling furnaces, one 6-tuyere run-out fire, 8 forge fires, one coal and one Smith gas heating furnace, 2 trains of rolls, (17 and 18-inch,) and 70 nail machines; product, iron and steel nails and muck bar; annual capacity, 150,000 kegs of nails and 4,000 net tons of muck bar. *See Milton Rolling Mill and Forge.*

York Rolling Mill, 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: 51. Of these 5 make Bessemer steel and 2 make open-hearth steel.

PITTSBURGH AND ALLEGHENY COUNTY.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Iron and Steel Company, Pittsburgh. 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; 123 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, iron and steel plates, angles, beams, channels, and structural shapes, 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 built in 1884, containing two 2-ton Clapp-Griffiths stationary converters, for the production of steel for miscellaneous uses; first blow made March 25, 1884; annual capacity in ingots, 48,000 net tons. Fuel used, natural gas exclusively. Henry W. Oliver, President; James B. Oliver, Treasurer; David B. Oliver, General Manager; James Smith, Secretary. *See Eagle Rolling Mill. See Furnaces in the Shenango Valley and in Allegheny county.*

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, structural shapes, steel billets, railroad splice-bars and bolts, boat spikes, machine bolts, and chains; 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. Fuel used, coal. 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 and coal.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Decline to give information concerning their works.

Braddock Wire Company, Pittsburgh. Works at Rankin Station, Alle-

gheny county. Built in 1885-6; 3 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, steel wire rods, plain wire, barb wire, and wire nails; annual capacity, 40,000 net tons. Fuel used, natural gas exclusively. J. W. Gates, President; William Edenborn, Vice-President; Wallace H. Rowe, Treasurer; T. B. Coles, Secretary.

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, 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 st., Pittsburgh. New York office, Mills Building. Built in 1862, and rebuilt in 1888; 4 Siemens heating furnaces, 7 direct air heating furnaces, 16 reducing furnaces for making iron direct from the ore, rotary squeezer, two 15-ton and two 30-ton open-hearth furnaces, and 3 trains of rolls (one guide mill, one 16-inch, and one 22-inch universal mill 36 inches wide); product, universal rolled plates and bars, and general merchant work on small mills; annual capacity, 40,000 net tons. Fuel used, natural gas exclusively. C. M. Raymond, President; H. W. Lash, General Manager; A. H. Keith, General Agent.

Carnegie Brothers & Co., Limited, branch offices and post-office address, 42-48 Fifth ave., Pittsburgh. Two mills in Allegheny county: Edgar Thomson Steel Works, at Bessemer, on Pennsylvania, Baltimore and Ohio, and Pittsburgh and Lake Erie railroads; built in 1874-5 by the Edgar Thomson Steel Company, Limited, and enlarged by Carnegie Brothers & Co., Limited; first blow made August 25, 1875, and first steel rail rolled September 1, 1875. Four 15-gross-ton Bessemer converters, 4 spiegel cupolas, (molten metal used, brought direct from Edgar Thomson Furnaces in ladles,) 22 Siemens heating furnaces, one 3-high 40-inch blooming mill, one power and one hydraulic shear, two 3-ton hammers for shearing and chipping blooms, two 3-high rail trains, (one 23-inch and one 24-inch,) and hot saws and finishing machinery; forge contains one 6-ton hammer and two heating furnaces. Product, Bessemer steel rails and billets; annual capacity, 535,000 net tons of ingots, 425,000 net tons of rails, and 1,000 net tons of billets. Brand, "E. T." Fuel, natural gas. Chas. M. Schwab, General Superintendent. Duquesne Steel Works, at Cochran, on Pittsburgh, Virginia, and Charleston Railway; built in 1886-8 by the Allegheny Bessemer Steel Company, and capacity increased in 1891 by Carnegie Brothers & Co., Limited; first blow made in February, 1889, and first rail rolled in March, 1889. Two 7-gross-ton Bessemer converters, 14 soaking pits, and 4 trains of rolls, (two 21-inch continuous

and reversing, one 26-inch, and one 28-inch.) Rails and billets rolled from ingot at initial heat; annual capacity, 235,000 net tons of rails or billets. Fuel, natural gas. Thomas Morrison, Superintendent. General officers of the company: H. C. Frick, Chairman; J. G. A. Leishman, Vice-Chairman and Treasurer; F. T. F. Lovejoy, Secretary and Auditor; E. H. Utley, General Agent. (For sales offices in various cities see Carnegie, Phipps & Co., Limited.) See *Edgar Thomson Furnaces*.

Carnegie, Phipps & Co., Limited, branch offices and post-office address, 42-48 Fifth ave., Pittsburgh. Three mills in Allegheny county: Homestead Steel Works, at Munhall, on Pittsburgh, Virginia, and Charleston Railway; Bessemer department built in 1880-1 by The Pittsburgh Bessemer Steel Company, Limited; first blow made March 19, 1881; first steel rail rolled August 9, 1881; open-hearth department built by Carnegie, Phipps & Co., Limited; 7 furnaces completed in October, 1886, one in July, 1890, and 8 in September, 1890. Two 5-gross-ton Bessemer converters, 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, one 40-inch cogging mill, one 35-inch beam mill, one 119-inch plate mill; one 12-gross-ton, six 20-gross-ton, eight 25-gross-ton, and one 35-gross-ton open-hearth furnace; press shop for forging and machine shop for finishing armor plate; product, blooms, billets, structural shapes, bridge steel, and boiler, armor, ship, and tank plate; annual capacity, 180,000 net tons of Bessemer steel ingots and 200,000 net tons of open-hearth steel ingots; fuel, natural gas. J. A. Potter, Superintendent. Upper Union Mills, at Thirty-third st., Pittsburgh; built in 1863-4 by the Cyclops Iron Company and Carnegie, Kloman & Co.; enlarged by Carnegie Brothers & Co., Limited, and Carnegie, Phipps & Co., Limited; 40 single puddling furnaces, 3 coal and 11 single and 5 double gas 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, and light steel rails; annual capacity, 85,000 net tons; fuel, natural gas. P. R. Dillon, Superintendent. Lower Union Mills, at Twenty-ninth st., Pittsburgh; built in 1861-2 by Kloman & Phipps, and enlarged by Wilson, Walker & Co., Limited, and by Carnegie, Phipps & Co., Limited; 37 single puddling furnaces, 28 heating furnaces, 6 trains of rolls, (2 universal, one 9, one 15, and two 20-inch,) 18 forge fires, and 14 hammers (700 to 7,000 pounds); product, universal mill plates, car forgings, bridge work, angles, axles, links, pins, and bar iron; annual capacity, 50,000 net tons; fuel, natural gas. P. R. Dillon, Superintendent. General officers of the company: Wm. L. Abbott, Chairman; H. M. Curry, Vice-Chairman; Otis H. Childs, Secretary; L. C. Phipps, Treasurer; F. T. F. Lovejoy, Auditor; Wm. P. Palmer, General Sales Agent. Sales offices of the Carnegie Associations: Atlanta, Gould

Building; Boston, Bell Telephone Building; Buffalo, Chapin Block; Chicago, Home Insurance Building; Cincinnati, Neave Building; Cleveland, Perry-Payne Building; Denver, Barclay Building; Grand Rapids, Wonderly Building; Minneapolis, Lumber Exchange Building; New York, 44-46 Wall st.; Philadelphia, 203 South Fourth st.; St. Louis, Bank of Commerce Building; San Francisco, 258 Market st. *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., (telegraph office, Mansfield Valley,) 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, 208 Wood st., Pittsburgh. Mill on the South Side. Built in 1846; 7 double and 19 single puddling furnaces, 11 heating furnaces, and 6 trains of rolls; product, bars, sheets, and plates; total annual capacity, 35,000 net tons. Fuel used, coal. 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 crucible steel-melting furnaces, and 18 hammers; 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 the same management as when operated in the name of Miller, Metcalf & Parkin.

Eagle Rolling Mill and Tube Works, Oliver Iron and Steel Company, lessee, Pittsburgh. Works, Thirty-fourth ward, South Side. Rolling mill built and put in operation in 1848; 21 single puddling furnaces, 4 steel-heating furnaces, and 3 trains of rolls, (one 16 and two 20-inch.) Tube works built in 1884. Product by lessee, muck bar. Fuel used, coal. *See Allegheny Iron Works. See Furnaces in Allegheny county and the Shenango Valley.*

Elba Iron Works, Oil Well Supply Company, Pittsburgh. Works, Second ave., Twenty-third ward. 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 iron, used at the com-

- pany's tube works; annual capacity, 36,000 net tons. Fuel used, bituminous coal. John Eaton, President; E. H. Cole, Vice-President; E. T. Howes, Treasurer; K. Chickering, Secretary. T. B. Everson, General Manager of Elba Iron Works Department.
- Etna Iron Works, Spang, Chalfant & Co., Pittsburgh. Office, 66, 68, and 70 Sandusky st., Allegheny City. Works at Etna, Allegheny county. 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 open-hearth furnaces; product, steel castings; annual capacity, 18,000 net tons. Uses no miscellaneous steel scrap. James Hemphill, Chairman; W. Wade, Secretary; Pennock Hart, Treasurer; N. A. Hemphill, Superintendent.
- Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Built in 1857; 32 heating furnaces, 13 automatic and 21 hand spike machines, and 7 trains of rolls, (four 8, one 9, and two 16-inch,) 3 trains being continuous for spike steel and 2 for merchant steel; product, steel railroad and boat spikes and merchant steel; annual capacity, 50,000 net tons spikes and 15,000 net tons bar steel. Spike brand, "Dilworth, Porter & Co.;" merchant steel brand, "Glendon." 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, and remodeled in 1891; two 6-gross-ton converters; first blow made August 26, 1881; 3 heating furnaces and 2 trains of rolls (26 and 32-inch); product, billets, blooms, and slabs, from 4 in. x 4 in. to 12 in. x 12 in.; annual capacity, 160,000 net tons. Fuel used, natural gas and coal. (Formerly operated by Pittsburgh Steel Casting Company.) Geo. T. Oliver, President; Stephen W. Tener, Secretary.
- Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 15 hammers, with 22 furnaces, 6 smith-shop fires, and one smith-shop steam hammer, one double and 4 single annealing furnaces, six 24-pot and two 30-pot crucible steel-melting furnaces, 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 30-gross-ton furnace, built in 1886, and one 20-gross-ton furnace, built in 1890; product, spring, plow, and machinery steel, and plates for boilers, hulls of vessels, etc.; annual capacity, 8,000 net tons of plates, 4,000 net tons of machinery steel, 2,000 net tons of plow steel, and 2,000 net tons of spring steel. Fuel used, natural gas, oil, and coal. 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; 93 John st., New York.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Established in 1824; 29 single puddling furnaces, 14 heating furnaces, 4 annealing furnaces, one 5-ton hammer, 10 trains of rolls, (2 muck trains, one 8, one 9, and one 16-inch bar, 2 sheet trains, 31 x 112-inch plate train, nail-plate train, and blooming-mill train,) 14 horse-shoe machines; two 12-gross-ton open-hearth steel furnaces, one built in 1879 and one built in 1881; two 6-gross-ton Bessemer converters, 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, toe calks, steel blooms, and sheet and plate iron; annual capacity, 140,000 net tons. Brand of 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.

Kensington Iron Works, H. Lloyd's Sons Company, (incorporated,) 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, 10,000 net tons. Fuel used, coal.

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 and cotton-ties; annual capacity, 25,000 net tons. Brand, "Keystone." Fuel used, coal. James McCutcheon, Chairman; N. M. McDowell, Secretary; James H. McCutcheon, Treasurer; Thomas Venners, Superintendent.

La Belle Steel Company, 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 crucible 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 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, coal. Formerly operated under the name of Smith Brothers &

Cò. Andrew D. Smith, President; Frank B. Smith, Secretary; Hugh D. Smith, Treasurer; Severn P. Ker, Assistant Secretary. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and 93 Liberty st., New York; Rice Lewis & Son, Toronto, Canada.

Liggett Spring and Axle Company, Pittsburgh. Works at Spruce and Market sts., Allegheny City. Built in 1865 and 1882; one 16-inch train of rolls, used to reroll iron and steel into shapes for the manufacture of springs and axles; product, buggy and wagon springs and axles. Thomas M. Erwin, Treasurer.

Linden Steel Company, general office and works, Second ave., Pittsburgh. Down-town office, Lewis Building. Open-hearth steel works, built in 1879, contain one 25-gross-ton and two 15-gross-ton open-hearth steel furnaces, 16 heating furnaces, one 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, 125 net tons. Brand, "Linden." Fuel used, natural gas, coal, and oil. Building one 25-gross ton open-hearth steel furnace. W. J. Lewis, President; Henry Lloyd, Vice-President and Treasurer; Cephas Taylor, Secretary; W. J. Lewis, Jr., Assistant Secretary; Richard Hurrell, Superintendent.

Lockhart Iron and Steel Company, 405 Bank of Commerce Building, Pittsburgh. Works (Vulcan Forge and Iron Works) at Chartiers Station, P. & L. E. R. R., McKee's Rocks P. O. Forge built in 1877; rolling mill built in 1882; 31 single puddling furnaces, 5 forge fires, 2 upsetting machines, 7 heating furnaces, 3 trains of rolls, (9, 16, and 23-inch,) and 4 hammers; product, bar iron, bridge iron, and soft steel in bars; annual capacity, 18,000 net tons of finished rolled iron and steel. Brands, "Vulcan" and "Lockhart." Fuel used, natural gas and coal. Charles Lockhart, President; T. J. Gillespie, Secretary and Treasurer.

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, 2 refinery fires, 7 annealing furnaces, 31 heating furnaces, 16 trains of rolls, (2 bar and 14 sheet,) and 10 hammers; open-hearth steel department contains two 20-gross-ton open-hearth furnaces built in 1889-90; product, sheet iron and sheet steel, both common and planished; specialty, patent planished sheet iron and sheet steel; annual capacity, 20,000 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, Millvale, Allegheny county. Post-office address, Bennett. 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 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, bituminous coal and producer gas. J. W. Friend, Chairman; F. N. Hoffstot, Secretary and Treasurer.

Monongahela Iron and Steel Company, Hay's Station, P. & L. E. R. R. Post-office address, Box 215, Pittsburgh. Built in 1891, and put in operation October 20, 1891; 20 single puddling furnaces and one train of rolls; product, muck bar; annual capacity, 15,000 net tons. Fuel used, coal. Robert A. Carter, President and Manager; W. M. Lorenz, Secretary and Treasurer.

National Tube Works Company, McKeesport, Allegheny county. Six 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 open-hearth steel furnace added in 1886. National Rolling Mill No. 2 was built in 1882; 18 single puddling furnaces, one heating furnace, one universal train of muck rolls, one set of slab rolls, and two 8-ton hammers. National Rolling Mill No. 3 was built in 1886; 42 single puddling furnaces, 6 heating furnaces, and 3 trains of rolls, (3-high muck, two sets, one 13-inch, and one 24-inch.) National Rolling Mill No. 4 was built in 1888-9; 20 single puddling furnaces, one 10-ton hammer, 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, 120,000 net tons. Brand, "National." National Forge and Iron Works were built in 1881; 26 forge fires, 2 run-out fires, 2 hammers, one heating furnace, and one set of slab rolls; product, blooms and billets for boiler tubes and boiler plate; annual capacity, 18,000 net tons. Boston Iron and Steel Works were built in 1890-1; 29 single and 2 double puddling furnaces and one universal muck train of rolls. Building four heating furnaces and one 8-inch and one 12-inch finishing train of rolls. Product, muck bar and skelp iron; annual capacity, 30,000 net tons. Fuel used, natural gas, from the company's own lines, and coal. E. W. Converse, President; P. W. French, Secretary; William S. Eaton, Treasurer; E. C. Converse, General Manager; J. H. Pierce, Assistant Manager; C. I. O'Connor, Purchasing Agent.

Oliver and Roberts Wire Company, 801 Bingham st., Pittsburgh. Rod

mill built in 1884, and first put in operation June 12, 1884; 4 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); product, wire rods; annual capacity, 50,000 net tons. Wire department contains all necessary machinery for the manufacture of plain and barb wire and wire nails; number of wire-nail machines, 132; annual capacity, 60,000 net tons of drawn wire, 20,000 net tons of barb wire and fencing specialties, and 600,000 kegs of wire nails. Fuel used, coal, oil, and natural gas. George T. Oliver, President; Henry Roberts, General Superintendent; William H. Cassidy, Treasurer; Stephen W. Tener, Secretary.

Pennsylvania Iron and Steel Works, W. J. Hammond & Sons, Pittsburgh. Built in 1843; 14 single puddling furnaces and one train of rolls; product, muck bar; annual capacity, 11,500 net tons. Fuel used, natural gas exclusively. (Sheet mill burned in July, 1887. Steel plant sold in 1890 to the Totten and Hogg Iron and Steel Foundry Company.) 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 (three 800-lb., four 1-ton, two 3-ton, and two 4-ton); product, bolts, nuts, bar iron, splice bars, draw bars, links and pins, arch bars, hammered car and locomotive axles, and general railroad and heavy forgings; total annual capacity, 29,000 net tons. Brands, "P. F. & I." and "Special." Fuel used, coal and manufactured gas. Calvin Wells, President and Treasurer; F. E. Richardson, Secretary; 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, 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 and coal. A. E. W. Painter, President; Jacob Painter, Jr., Secretary; C. K. Reppert, Treasurer.

Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. Built in 1871; one 18-pot and two 24-pot crucible steel-melting furnaces, and 11 annealing furnaces. Bessemer steel plant added in 1890; one 10-gross-ton converter; product, Bessemer and crucible steel castings; annual capacity, 5,000 net tons. Fuel used natural gas, coal, and coke. Wm. G. Johnston, President; Jas. J. Donnell, Vice-President; Augustus Trump, Secretary and Treasurer; Stewart Johnston, Superintendent.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at Chartiers, Pittsburgh and Lake Erie Railroad; estab-

lished in 1845; present works built in 1882-3; 15 heating furnaces, 3 trains of rolls, (20 and 16-inch and combined 10 and 12-inch,) and 8 hammers, ranging from 60 pounds to 7 tons; two 33-pot crucible 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 kinds; annual capacity, 15,000 net tons. Fuel used, natural gas, obtained from their own territory, and coal. David Shaw, Superintendent. Sole proprietors, Herbert DuPuy and David Shaw. Selling agents, M. T. Miles & Son, Chicago; W. J. Woosley, St. Louis. E. E. McCargo, sole Eastern agent, Philadelphia and New York.

Pittsburgh Wire Company, Braddock, Allegheny county. Branch office, 33-43 Seventh ave., Pittsburgh. Built in 1891, and to be put in operation early in 1892; 2 heating furnaces and 3 trains of rolls (9, 12, and 16-inch); product, copper and steel wire rods and wire; annual capacity, 25,000 net tons. Fuel used, bituminous coal. Thomas W. Fitch, President; Pennock Hart, Treasurer. General agents, Bindley Hardware Company, Pittsburgh.

Reliance Steel Casting Company Limited, Pittsburgh. Built in 1889; one 18-pot crucible 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, 16 heating furnaces, 5 sheet furnaces, and 10 trains of rolls (one 13, one 16, two 20, four 22, one 24-inch, and one 3-high plate train); product, boiler tube and pipe iron and sheet and plate iron; annual capacity, 35,000 net tons of boiler tube and pipe iron, 7,500 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. (Owned by the National Tube Works Company.) Horace Crosby, Manager.

Sable Iron Works, Zug & Co. Limited, Pittsburgh. Built in 1845; 42 single puddling furnaces, 11 heating furnaces, 6 trains of rolls (one 8, one 10, and one 16-inch, one universal mill, one 18-inch bar mill, and one 3-high 20-inch muck train, 3 sets); product, merchant bar iron, including heavy sizes of flat bars and squares made on the universal 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; C. Zug, Treasurer; T. C. Clarkson, Secretary. Eastern sales agents, E. T. Day, New York, and 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 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 and coal. 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; 38 single puddling furnaces, 12 heating furnaces, 2 hammers, and 6 trains of rolls (12, 16, 18, 20, 24, and 30-inch); product, bars, angles, sheets and plates, and light T rails; boiler plates a specialty; make "Sligo" bars and "Tyronne" refined iron; boiler heads and flue holes flanged to order; annual capacity, 24,000 net tons. Fuel used, coal.

Soho 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, (including 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 sheared and grooved skelp iron; annual capacity, 35,000 net tons. 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, producer gas, and coal. M. K. Moorhead, President; Charles R. Dallas, Secretary; W. J. Moorhead, Treasurer. *See Furnaces.*

Solar Iron and Steel Works, William Clark's Son & Co., Pittsburgh. Built in 1869; 20 single puddling furnaces, 11 heating furnaces, and 7 trains of rolls (one 7-inch hoop, three 8-inch hoop, one 9 and one 12-inch bar, and one 20-inch muck); two 12-gross-ton open-hearth steel furnaces added in 1889-90; product, hoop, band, box, and scroll iron and steel, and cotton-ties; annual capacity, 20,000 net tons. Brands, "Solar" and "Clark" for iron and steel and "Delta" and "Arrow" for cotton-ties. Fuel used, natural gas and coal.

Spang Steel and Iron Company, Pittsburgh. Office, 66-70 Sandusky st., Allegheny City. Works at Etna, Allegheny county. Built in 1880-1; three 10-ton open-hearth steel furnaces, 7 heating furnaces, one hammer, and 4 trains of rolls (30-inch bloom, 30-inch universal, 18-inch bar, and 112 x 31-inch plate); product, steel boiler, ship, and tank plates, and machinery 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 and coal. Campbell B. Heron, President; 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; Smith, Jameson & Keyser, Baltimore; Bassett, Presley & Train, Cleveland; Houston & Co., Cincinnati; Fletcher, Jenks & Co., Detroit; Avery & West, Chicago.

Star Iron Works, Lindsay & McCutcheon, 88 Rebecca st., Allegheny City. Built in 1862; 38 single puddling furnaces, 11 heating furnaces, and 8 trains of rolls (four 8, one 10, and one 12-inch, and two muck); product, hoop, band, and horse-shoe iron; also strap and T hinges, wrought-iron washers, and cotton-ties; annual capacity of rolled iron, 12,000 net tons. Brand, "Star." Fuel, natural gas and coal.

Sterling Steel Company, Westinghouse Building, Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; two 24-pot crucible steel-melting furnaces, 6 heating furnaces, and 5 hammers (800 to 2,500 pounds); product, fine crucible tool steel; annual capacity, 3,000 net tons. Brand, "Sterling." Fuel used, coal. 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; Wm. J. Haines & Co., Philadelphia; McBarron & Co., Boston; William G. Wetherall, Baltimore; Church and Russell Company, Providence; Walbridge & Co., Buffalo; Cleveland, Brown & Co., Cleveland; S. D. Kimbark, Chicago; George W. Gibbs & Co., San Francisco.

Totten and Hogg Iron and Steel Foundry Company, Twenty-fourth st. and A. V. R. R., Pittsburgh. One 15-gross-ton open-hearth steel furnace purchased and removed from W. J. Hammond & Sons' works in 1890-1; product, steel castings.

United States Iron and Tin Plate Works, United States Iron and Tin Plate Manufacturing Company, Demmler P. O., (Eighth ward, McKeesport,) Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Built in 1873-4; burned and rebuilt in 1883; 5 single puddling furnaces, 3 heating furnaces, 4 knobbling fires, 4 double sheet-mill furnaces, 5 annealing furnaces, 6 tinning stacks, one hammer, one squeezer, 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 and open-hearth steel sheets and plates, tin and terne plates, and sheet-iron dripping pans; annual capacity, for black plates 6,000 net tons, for tin and terne plates 5,000 net tons. Black plates branded "Monongahela," "U. S. A. M.," and "J. H.;" tin and terne plates and dripping pans branded "U. S." Fuel used, coal for boilers and heating and puddling furnaces, oil gas for sheet finishing department, and natural gas for tinning department. Building 4 new tinplate mills, 4 double tin-mill furnaces, 4 annealing furnaces, and 2 trains of cold rolls. W. C. Cronmeyer, President; Edward Ely, 1st Vice-President; A. J. Demmler, 2d Vice-

- President; F. E. Schenck, Treasurer; W. A. Demmler, Auditor; Charles V. McLean, Secretary. Eastern agents, Ely & Williams, Philadelphia, New York, and Boston. *See Tinplate Works.*
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Office, 64, 66, and 68 Anderson st., Allegheny City. Works at Sharpsburg, Allegheny county. Built in 1846; 28 single puddling furnaces, 10 heating furnaces, one 4-ton hammer, and 5 trains of rolls (one 8, one 15, two 18, and one 24-inch); product, skelp, plate, and bar iron; annual capacity, 25,000 net tons. Brand, "Vesuvius."
- Wayne Iron and Steel Works, Brown & Co., (incorporated,) Pittsburgh. Built in 1829; 34 single puddling and 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, 18,000 net tons of iron and 7,000 net tons of crucible steel. Brands, "Wayne" and "U. S." Fuel, natural gas. J. Stuart Brown, President and Treasurer; Henry Graham Brown, Vice-President and General Manager; James Neale, Secretary.
- West Penn Steel Works, Jennings Brothers & Co. Limited, Pittsburgh. Office and steel plant on Preble avenue, Allegheny City; built at Leechburg, Armstrong county, in 1881, and removed to present site in 1890; one 10-gross-ton open-hearth furnace, one heating furnace, and one 8-ton hammer; product, steel, principally consumed at the firm's rolling mill at Leechburg in the production of sheets and light plates; annual capacity, 7,000 net tons of ingots. Fuel used, producer gas and natural gas. Adding one 14-inch train of bar rolls. Benjamin F. Jennings, Chairman; John Davis, Treasurer; T. Dale Jennings, Secretary. *See Rolling Mills in Western Pennsylvania.*
- Number of rolling mills and steel works in Pittsburgh and Allegheny county: 63. Of these 7 make Bessemer steel, 2 make Clapp-Griffiths steel, 18 make open-hearth steel, 10 make crucible steel, and 3 make blister steel.

WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

- ✓Aliquippa Steel Company, Westinghouse Building, Pittsburgh. Works at Aliquippa, Beaver county. Building a plant to contain 9 heating furnaces, 4 trains of rolls, (10-inch guide, 18-inch bar, 18-inch finishing, and 26-inch plate,) 3 hammers, (850-lb., 1,500-lb., and 6-ton,) one 15-gross-ton open-hearth steel furnace, and one 36-pot crucible steel-melting furnace; product to be sheets, plates, and agricultural steel. Fuel, natural gas. Joseph S. Kaufman, President; James C. Russell, Vice-President; B. Forst, Secretary and Treasurer.
- Apollo Rolling Mills, Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Built in 1850; 14 single puddling furnaces, 3 bar furnaces, 16 heating and 12 annealing furna-

ces, one 6-ton hammer, and 10 trains of rolls (one muck, one 3-high 22-inch bar, and 8 double sheet); two 20-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, 20,000 net tons. Brand, "Apollo." Fuel used, natural gas and coal. George G. McMurtry, President; Wm. B. Rhodes, Secretary; Wallace P. Bache, Treasurer.

Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Pittsburgh office, Lewis Building. 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. P. H. Laufman, Chairman; W. B. Laufman, Secretary; S. M. Jackson, Treasurer; S. A. Gourley, Superintendent. *See Tinplate Works.*

Arethusa Iron Works, George W. Johnson, New Castle, Lawrence county. Built in 1873; 13 single and 3 double puddling furnaces, 9 heating furnaces, 4 trains of rolls, (two 21 and two 24-inch,) one hammer, and one squeezer; product, plate and sheet iron; annual capacity, 13,000 net tons. Fuel used, slack coal. Jacob James, Manager; George W. Hartman, Bookkeeper.

Aschman (The) Steel Casting Company, Sharon, Mercer county. Built in 1890-1, and first steel made June 5, 1891; one 5-gross-ton open-hearth steel furnace; product, steel castings; annual capacity, 2,000 net tons. E. A. Wheeler, President; J. J. Spearman, Treasurer; G. A. Baird, Secretary; E. Roberts, Manager.

Beaver Falls Mills, Carnegie, Phipps & Co., Limited, Beaver Falls, Beaver county. Branch office and post-office address, 42-48 Fifth ave., Pittsburgh. Built in 1883 by the Hartman Steel Company, Limited, and enlarged by Carnegie, Phipps & Co., Limited. Operations began September 1, 1883. Combination rod train run by 3 engines, 3 heating furnaces, 142 wire blocks run by 3 engines, and 118 wire-nail machines run by 2 engines. Merchant steel department contains 4 heating furnaces and 3 trains of rolls (10, 12, and 18-inch); product, steel wire rods, wire, wire nails, tire steel, and merchant steel bars; annual capacity, 54,000 net tons of wire rods and 30,000 net tons of merchant steel. Fuel, producer gas for heating furnaces and coal, with automatic stokers, under boilers. P. R. Dillon, 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 crucible steel-melting furnace, one Siemens and 3 coal heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 9 and one 16-inch); steam and water

power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,600 net tons. Brand, "Beaver." Fuel used, mainly coal. James M. May, Treasurer and Superintendent.

Blairsville Rolling Mill and Tin Plate Company, Blairsville, Indiana county. Building a rolling mill and tinning plant; 2 doubling, one pair, and 2 annealing furnaces, and one 20-inch train of rolls and one 18-inch cold rolling train; product, black plates for tinning. Jacob Graff, President; John H. Devers, Vice-President; D. M. Fair, Secretary and Manager; T. D. Cunningham, Treasurer. *See Tinplate Works.*

Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Two works: Cambria Iron and Steel Works, built in 1853; 13 Siemens and 29 reverberatory heating furnaces, one 7-ton, one 5-ton, one 3-ton, three 6,000-lb., one 3,500-lb., and one 2,500-lb. hammer, and the following trains of rolls: One 24-inch, 2 sets, and one 21-inch rail mill, 3 sets; two 21-inch bar mills, 3 sets each; 12-inch splice-bar mill, 4 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 4 sets; one rod train, 10 sets; 48-inch blooming mill, one set; 40-inch blooming mill, one set: total, 34 sets. Bessemer steel works made their first blow July 10, 1871; two 11½-gross-ton converters; annual capacity, 325,000 net tons of ingots. Three 20-gross-ton open-hearth steel furnaces, with the Pernot improvement, built in 1878-9; one 15-ton Krupp washer; annual capacity, 30,000 net tons of ingots. Product, steel rails, splice bars, angles, flats, rounds, axles, billets, and wire rods; capacity of finished steel per annum, 225,000 net tons of steel rails and 75,000 net tons of steel in other shapes. Building two 11½-gross-ton Bessemer converters and one billet train with two sets of rolls. Gautier Steel Department, built in 1878; damaged by flood in May, 1889, and partly rebuilt in same year; 7 reverberatory and 2 Siemens heating furnaces; 6 trains of rolls, (one 9-inch, 6 sets; one 10-inch, 8 sets; one 12-inch, 4 sets; one 16-inch, 3 sets; one 20-inch, 3 sets; and one 12-inch cold rolling train,) 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 of rolling mill, 75,000 net tons. Production of separate departments: Plow shapes and slabs, annual capacity, 7,000 net tons; finished plow shapes, 3,000 tons; tire steel, 8,000 tons; spring steel, 15,000 tons; machinery steel, 4,000 tons; harrow teeth, 1,800 tons; horse-rake teeth, 150,000 sets; finger-bars, 125,000 bars; cold-rolled steel, 4,000 tons. Erecting cold-drawing and shafting plant and wire mill. Officers in Philadelphia: Powell Stackhouse, President; John W. Townsend, Vice-President; J. Lowber Welsh, 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. Fred. Krebs, Superintendent Gautier Steel Department. Branch offices Gautier Steel Department: 102 Chambers st., New York; southwest corner Fifth and Commerce sts., Philadelphia; Phoenix Building, Chicago. *See Furnaces. See Rolling Mills in Maryland.*

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, Bank of Commerce Building, Pittsburgh. Built in 1882; 7 single puddling furnaces, 2 knobbling fires, 6 heating furnaces, (2 sheet, 2 pair, and 2 pile,) 4 annealing furnaces, 3 trains of rolls, and one 5-ton hammer; product, finest quality of sheet iron and steel for stamping and tinning purposes; annual capacity, 6,000 net tons. Fuel, natural gas, from the company's own wells. —, President; H. H. Niemann, Vice-President; L. A. Meyran, Secretary and Treasurer; H. S. Duncan, Business Manager; Paul C. Herrosee, Auditor; J. F. Budke, General Superintendent of works.

Columbia Iron and Steel Company, Uniontown, Fayette county. Pittsburgh office, 132 First ave. Built in 1886-7; two 5-gross-ton Bessemer steel converters, 2 soaking pits, 4 heating furnaces, one 32-inch blooming mill, and one 26-inch and one 18-inch train of rolls; 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. Fuel used, coal. Robert Hogsett, President; E. M. Butz, Vice-President and General Manager; W. N. Kratzer, Secretary; M. H. Bowman, Treasurer.

Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. Built in 1879; rebuilt in 1884; 3 single puddling furnaces, 4 heating furnaces, one 16-inch train of rolls, and 5 hammers; crucible steel department has six 6-pot steel-melting holes; product, special tool steel and refined hammered iron. Fuel used, natural gas exclusively.

Emmens Metal Company, Youngwood, Westmoreland county. Built in 1891; one 4-pot melting furnace; product, castings in nickel-steel and other alloys and metals. Building a second furnace of same size. Stephen H. Emmens, President; Cecil D. Landale, Secretary.

Etna Iron Works Limited, New Castle, Lawrence county: Consolidation, in November, 1874, of Etna Iron Company and Onondaga Iron and Nail Company; 2 double and 27 single puddling furnaces, 5 heating furnaces, 55 nail machines, and 4 trains of rolls (8, 16, 2-high 18, and 3-high 18-inch); product, merchant bar iron and pipe iron; annual capacity, 20,000 net tons. Fuel used, coal, and slack with blast for puddling. (Nail factory idle since 1888 and not likely to be operated again.) Edwin N. Ohl, Chairman and Manager; A. W. Thompson, Secretary and Treasurer. *See Shenango Valley Furnaces.*

Greensburg Rolling Mill Company, Greensburg, Westmoreland county. Steel plant built in 1889-90 by the Greensburg Steel Company, con-

taining 2 forge fires, 4 heating furnaces, 3 hammers, (1,000-lb., 1,500-lb., and 2-ton,) and one 24-pot crucible steel-melting furnace; product, tool steel. Purchased by present company late in 1891, with the intention of adding a rolling mill. R. Coulter, George H. Huff, James C. Clarke, and Thomas Donohoe, members of company.

Hussey, Binns & Co. Limited, Pittsburgh. Works originally built at Pittsburgh in 1875; new plant built in 1890-1 at Charleroi, Washington county, on Monongahela Division of Pennsylvania Railroad; one 24-pot crucible steel-melting furnace, 18 heating furnaces, 4 trains of rolls, 2 steam hammers, 2 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 of ingots. Fuel used, natural gas exclusively. Ralph H. Binns, Chairman; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent.

Johnson Company, Johnstown, Cambria county. Built in 1887-8, and first put in operation May 13, 1888; 4 gas heating furnaces and one 27-inch train of rolls. Open-hearth steel department started in September, 1889; one 2-gross-ton open-hearth furnace, using oil gas, and one 7-gross-ton open-hearth furnace, using coal producer gas; annual capacity, 7,000 net tons of ingots and heavy castings. Product, girder rails and street railroad specialties entirely; annual capacity, 100,000 net tons. Also operates switch and drop-forging works. Arthur J. Moxham, President; Tom L. Johnson and Daniel Coolidge, Vice-Presidents; Wm. McLain, Secretary; Max M. Suppes, Manager of rolling mill; George R. Elder, Manager of switch works; B. F. Watkins, Manager of steel foundry.

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, 30,000 net tons. Greenville Rolling Mill, at Greenville, Mercer county, built in 1871; 30 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, hoop and band iron and steel and cotton-ties; annual capacity, 15,000 net tons. Use natural gas for fuel at Sharon.

Kittanning Iron Company Limited, Kittanning, Armstrong county. Built in 1848, rebuilt in 1880; 33 single puddling furnaces, 5 heating furnaces, and one 3-high 22-inch train of rolls; product, muck bar; annual capacity, 22,000 net tons. Fuel used, natural gas exclusively. James Mosgrove, Chairman; Henry A. Colwell, Secretary and Treasurer; Charles T. Neale, General Manager. *See 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, 2 trains of tire rolls, and 3 ham-

- mers, (1,150-lb., 7-ton, 20-ton.) Open-hearth steel department contains two 20-gross-ton 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, 15 heating furnaces, 6 annealing furnaces, 5 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, 7,000 net tons. Fuel used, natural gas and coal. Brand, "Leechburg." John C. Kirkpatrick, Chairman; M. W. Leech, Secretary and Treasurer.
- Myers (The H. M.) Company, Beaver Falls, Beaver county. Rolling mill built in 1883; 2 heating furnaces and 3 trains of 18-inch rolls; product, rolled shovel blanks, used by the firm in its shovel works.
- National Separating and Manufacturing Company, West Bridgewater, Beaver county. Office, 702 Duquesne Way, Pittsburgh. Steel plant with one small open-hearth furnace for producing steel castings. Works also contain appliances for the manufacture of light castings of iron, solder, or Babbitts metal. Wm. M. Brown, President; W. E. Griffiths, Vice-President; W. F. Miller, Secretary and Treasurer.
- New Castle Wire Nail Company, New Castle, Lawrence county. Nail factory and wire mill built in 1887 and enlarged in 1891; rod mill added in 1889; 2 gas heating furnaces, 4 trains of rolls, (9, 10, 12, and 16-inch,) one hammer, and 140 nail machines; product, wire rods, wire, and wire nails; annual capacity, 50,000 net tons of rods, 50,000 tons of wire, and 600,000 kegs of nails. (Rod mill formerly owned by the New Castle Steel Company.) Wm. Patterson, President; Edward King, Vice-President; Rufus Patterson, Secretary; John P. H. Cunningham, 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, 4 sheet annealing 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, coal. P. S. Loucks, Chairman; J. R. Stauffer, Treasurer; C. Grazier, Secretary.
- Sharon Iron Company Limited, Sharon, Mercer county. Built in 1850; 10 single and 14 double puddling furnaces, 12 heating furnaces, 9 trains of rolls, (one 8, one 12, one 16, two 18, one 20, one 22, and two

- 24-inch,) and 64 nail machines; product, bar, band, hoop, tank, and sheet iron and steel, and light T rails; annual capacity, 30,000 net tons. Use producer gas in heating furnaces. C. H. Buhl, President, Detroit, Mich.; F. H. Buhl, General Manager and Treasurer, and David Adams, Secretary, Sharon. *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 open-hearth furnace; product, open-hearth steel castings of all kinds; annual capacity, 10,000 net tons. Use producer gas. Erecting one 4-gross-ton Bessemer converter for the manufacture of castings. F. H. Buhl, President; S. McClure, Vice-President; Daniel Eagan, Secretary and General Manager; John Forker, Treasurer.
- Shenango Valley Steel Company, New Castle, Lawrence county. Building Bessemer steel works, to contain two 8-gross-ton converters, one 36-inch blooming mill, and two 5-hole soaking pits; estimated annual capacity, 165,000 net tons of billets. Wm. E. Reis, President; James Crawford, Vice-President; George B. Berger, Secretary and Treasurer; John Stevenson, Jr., Superintendent.
- Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 9 double puddling furnaces, one heating furnace, 2 hammers, (2½-ton and 5-ton,) and 2 trains of 3-high 18-inch rolls; product, muck bar and hammered blooms for steel purposes; annual capacity, 12,800 net tons. Fuel used, coal. Brand, "Stewart." Fayette Brown, Chairman, Harvey H. Brown, Treasurer, and D. B. Chambers, Secretary, Perry-Payne Building, Cleveland, Ohio; Samuel McClure, Agent and Manager, Sharon. *See Furnaces.*
- Tyler (The) Tube and Pipe Company, Washington, Washington county. Built in 1890-1, and first put in operation in January, 1891; 8 forge fires, one run-out fire, 4 heating furnaces, 2 trains of rolls, (16 and 18-inch,) and 2 hammers; product, charcoal blooms and charcoal skelp iron, used by the company in the manufacture of boiler tubes; annual capacity, 15,000 net tons. Fuel used, natural gas and charcoal. William P. Tyler, President and Manager; Charles A. Bumpus, Secretary; Walter Woodman, Treasurer; C. S. Stone, Assistant Treasurer; Peter Swanger, Superintendent.
- West Penn Steel Works, Jennings Brothers & Co. Limited, Pittsburgh. Office and steel plant on Preble ave., Allegheny City, Allegheny county. Rolling mill at Leechburg, Armstrong county. Built in 1886; 9 heating furnaces, 3 annealing furnaces, two 22-inch trains of rolls, and 2 stands of cold rolls; product, fine sheet steel and light plate steel; annual capacity, 7,500 net tons. Fuel used, natural gas. (Open-hearth steel plant removed to Allegheny City in 1890.) *See Rolling Mills and Steel Works in Allegheny County.*
- Wheatland Iron Company, Wheatland, Mercer county. Pittsburgh office, 208 Wood st. Built to roll rails in 1872; 13 double puddling furna-

ces, 12 heating furnaces, and 3 trains of 24-inch rolls; product, plate iron; 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.

Wilkes Rolling Mill Company, Sharon, Mercer county. Building a rolling mill to contain 5 puddling furnaces and one 3-high 20-inch train of rolls for the production of muck bar. Fuel, coal. James B. Wilkes, President and Manager; Joseph H. Anderson, Vice-President; Samuel Wilkes, Secretary and Treasurer.

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 31 completed, and 4 building. Of these 2 make Bessemer steel, and 2 Bessemer steel plants are being built, 8 make open-hearth steel, and 1 open-hearth steel plant is being built, and 5 make crucible steel, and 1 crucible steel plant is being built.

Total number of rolling mills and steel works in Pennsylvania: 211 completed, and 4 building. Of these 18 make Bessemer steel, and 2 Bessemer steel plants are being built, 3 make Clapp-Griffiths steel, 1 makes Robert-Bessemer steel, 38 make open-hearth steel, and 2 open-hearth steel plants are being built, 23 make crucible steel, and 1 crucible steel plant is being built, 4 make blister steel, and 3 make special steel.

DELAWARE.

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; one single and 8 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls, (one 10 and two 18-inch.) Old Ferry Mill, built in 1868; burned and rebuilt in 1891; 2 single and 9 double puddling furnaces, 9 heating furnaces, and 8 trains of rolls, (four 9, one 14, one 16, and two 18-inch.) Product, iron and steel splice bars, track bolts, railroad spikes, boat, wharf, and countersunk spikes, machine bolts, nuts and washers, boiler, boat, and bridge rivets, bridge rods, merchant bars, rivet rods, horse-shoe iron, horse and mule shoes, forgings, and castings; total annual capacity, 45,000 net tons. Brand, the letter "S" inclosed in a diamond. George W. Todd, President and Treasurer; L. A. Bower, Vice-President; Howard T. Wallace, Secretary; John W. Todd, General Superintendent.

Edge Moor Iron Company, Edge Moor, New Castle county. Philadelphia office, 1600 Hamilton st. Rolling mill, partly built in 1882, contains 4 heating furnaces and 2 trains of rolls (one roughing train and one 26-inch plate train with rolls 104 in. wide); auxiliary machinery not finished. William Sellers, President; John Sellers, Jr., Vice-President; William H. Connell, Treasurer.

Johnson Forge Company, Wilmington. Built in 1889; 7 puddling furnaces, one heating furnace, and one 3-high train of rolls; product, muck bar; annual capacity, 10,500 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 and 1889; 3 double puddling furnaces, 4 grate heating furnaces, 2 reverberatory heating furnaces, 3 box annealing furnaces, and 4 trains of rolls (one 20 and three 22-inch); steam and water power; product, sheet iron; annual capacity, 3,250 net tons. Brands, "Star" and "Delaware cleaned." A factory for the manufacture of pans and elbows added in 1889; daily capacity, 2 tons.

Minquas Iron Works, McCullough Iron Company, Wilmington. Built in 1873, and first put in operation in 1875; 6 single and 2 double puddling furnaces, 2 reverberatory heating furnaces, 3 grate heating furnaces, 3 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. J. L. McDaniel, President; Enoch McCullough, Vice-President; John W. McCullough, 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, 2 annealing furnaces, 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 Mendinhal, President; John M. Mendinhal, 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 forge fires, 3 heating furnaces, 2 trains of rolls, and one hammer; product, charcoal boiler plate, tank, and flue 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. New York office, 68 Wall st., Room 4. First mill built in 1845, second in 1870, another in 1875; 6 forge fires, 5 heating furnaces, 3 trains of rolls, (17, 19, and 24-inch,) and 3 hammers; product, charcoal boiler plates and plate iron generally; annual capacity, day turn, 5,000 net tons. W. Hastings, President; E. T. Canby, Treasurer; W. P. Hastings, Secretary; H. B. Seidel, Consulting Director. Number of rolling mills in Delaware: 9.

MARYLAND.

Crown and Cumberland Steel Company, Cumberland, Alleghany county. Built in 1873-4; rebuilt in 1884, and enlarged in 1889; 22 heating and welding furnaces, one Siemens 24-pot crucible steel-melting furnace, 5 hammers, (2 cushion, 2 helve, and one 1,000-lb. drop,) and 2 trains of rolls (9-inch rod and 16-inch bar and sheet); also 10-ton and 20-ton presses for punching pick-eyes and axe-polls; product, all kinds of rolled and hammered tool, machinery, tire, and agricultural steel, shapes, car axles and forgings, rake teeth, pick-eyes, and axe-polls; annual capacity, 10,000 net tons. Efforts being made to reorganize company under title of Cumberland Steel and Iron Company, by Hicks & Dickey, 413 Commerce st., Philadelphia, owners of the works. The addition of one 10-gross-ton open-hearth steel furnace is contemplated.

Cumberland Rolling Mill, Cambria Iron Company, lessee, 218 South Fourth st., Philadelphia. Mill at Cumberland, Alleghany county. 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. Only operating small mills, producing merchant steel; annual capacity, 29,000 net tons. Owned by the Baltimore and Ohio Railroad Company. *See Rolling Mills and Furnaces in Pennsylvania.*

Locust Point Iron and Steel Works, Coates & Co., Locust Point, Baltimore. Built in 1862; one double puddling furnace, 3 heating furnaces, 2 trains of rolls, and one hammer; product, plate, tank, and flue iron and steel; annual capacity, 7,500 net tons. Adding machinery for the manufacture of tinplates. *See Tinplate Works.*

McCullough Iron Company, Northeast and Rowlandville, Cecil county. Two works in Cecil county: Northeast Works, at Northeast, 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 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 Octoraro Works were originally built in 1829; 4 heating furnaces and 2 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. (The West Amwell Works were abandoned in 1890.) Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. J. L. McDaniel, President; Enoch McCullough, Vice-President; John W. McCullough, Secretary; Henry Whiteley, Treasurer. *See Rolling Mills in Delaware. See Bloomaries.*

Maryland Steel Company, 208 South Fourth st., Philadelphia. Works at Sparrow's Point, Baltimore county. Built in 1889-91; two 20-gross-ton Bessemer steel converters, 48 soaking pits, one 34-inch blooming mill, and one 26-inch rail train; first blow made August 1, 1891, and first steel rail rolled August 3, 1891; molten metal direct from the blast furnaces used in the converters; product, standard sections of rails; annual capacity, 300,000 net tons. Fuel used, petroleum. The company has partly finished the erection of a plant for shipbuilding purposes. New York office, 2 Wall st.; Boston office, 70 Kilby st. F. W. Wood, President, Sparrow's Point; Edmund N. Smith, Secretary and Treasurer, Philadelphia. Selling agent, Stephen W. Baldwin, New York. *See Furnaces.*

Number of rolling mills and steel works in Maryland: 6. Of these 1 makes Bessemer steel and 1 makes crucible steel.

VIRGINIA.

Covington Iron Company, Covington, Alleghany county. Main office, Ironton, Ohio. Began in 1891 the erection of a rolling mill to contain 11 double puddling furnaces and one train of muck rolls. E. J. Bird, Jr., Engineer of construction, Ironton. *See Furnaces.*

Crescent Horse Shoe and Iron Company, Max Meadows, Wythe county. Philadelphia office, Bullitt Building. Building a rolling mill to contain 2 heating furnaces and 2 trains of rolls (one 9 and one 15-inch) for the manufacture of merchant bar and creased horse-shoe iron; machinery to be added for making finished horse and mule shoes. Clarence M. Clark, President, and Horace W. Sellers, Secretary and Treasurer, Philadelphia; William Seaman, Vice-President, and William Eynon, Superintendent, Max Meadows.

Goshen Rolling Mill, Goshen Land and Improvement Company, Goshen Bridge, Rockbridge county. Began in 1890 the erection of a rolling mill; nearly completed; 6 double puddling furnaces and one 3-high 18-inch muck and one 10-inch train of rolls erected; boilers built over the puddling furnaces; one heating furnace; designed for the manufacture of guide, band, and bar iron. C. P. Ehrman, President; E. H. Dieffenbach, Secretary; W. W. Nevegold, Superintendent.

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, 2 squeezers, 6 trains of rolls, (two 9, three 18, and one 20-inch,) and 146 nail machines. Bessemer steel works built in 1887; two 3-ton converters and blooming mill; first blow made October 10, 1887; idle since 1888. Works operated by water-power and by steam

generated from waste heat of puddling furnaces; product, muck bar, iron and steel cut nails and spikes, merchant, car, and bridge iron, steel wagon tires, horse and mule shoes, etc.; annual capacity, 45,000 net tons of iron and steel. Sole manufacturer of the Walker horse and mule shoes. Brands, "Old Dominion" for nails and bar iron and "Walker Forged" for horse and mule shoes. Arthur B. Clarke, President; Douglas Baird, General Superintendent; John D. Baird, Assistant Superintendent; George Wm. Catlett, Secretary.

Richlands Iron Company, Richlands, Tazewell county. Philadelphia office, 134 South Fourth st. Built in 1891, and first put in operation in June, 1891; 14 double puddling furnaces and two 21-inch trains of rolls; product, muck bar; annual capacity, 23,000 net tons. Evans R. Dick, President; Saunders Lewis, Jr., Secretary and Treasurer; George McCall, Manager.

Richmond Standard Spike and Iron Company, Richmond. Two works: Manchester Rolling Mill, at 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. Iron Gate Rolling Mill, at Iron Gate, Alleghany county, built in 1890-1; 13 single and 4 double puddling furnaces, 4 forge fires, one double gas and one coal heating furnace; 3 trains of rolls, (9, 18, and 19-inch,) and one hammer; product, muck bar, bar iron, car shapes, railroad, boat, and ship spikes, and links and pins; annual capacity, 25,000 net tons. Byrd Warwick, President; J. T. Anderson, Secretary and Treasurer; R. W. Jeffery, Superintendent of Manchester works; J. C. Taliaferro, Superintendent of Iron Gate works.

Roanoke Iron Company, Roanoke, Roanoke county. Building a rolling mill to contain 16 double puddling furnaces, 2 trains of rolls, (one 3-high 22-inch muck and one 26 x 84-inch plate,) and one 8,000-lb. hammer; product to be muck bar and plate iron; annual capacity, 15,000 net tons. Joseph H. Sands, President; James E. Porter, Secretary and Treasurer; Henry King, General Manager. *See Furnaces.*

Roanoke Rolling Mill Company, Roanoke, Roanoke county. Built in 1888-9, and put in operation May 1, 1889; 11 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, muck bar and merchant iron; annual capacity, 12,000 net tons. Idle.

Shenandoah Rolling Mill, Shenandoah Furnace Company, Shenandoah, Page county. Building a rolling mill to contain 12 double puddling furnaces, one heating furnace, and 3 trains of rolls (22-inch muck, 18-inch bar, and 10-inch guide); product to be merchant bar iron; estimated annual capacity, 15,000 net tons. David W. Flickwir, President, Roanoke; Howard Winston, Secretary and Treasurer, Shenandoah. *See Furnaces.*

Tredegear Iron Works, Tredegear Company, Richmond. Built in 1836; 4 coal and 7 gas heating furnaces, one scrap furnace, 7 trains of rolls, and 2 hammers; steam and water power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, links and pins, car iron, and horse-shoes; annual capacity, 50,000 net tons. Foundry and machine shops, run by water-power, contain 2 air furnaces, one brass furnace, and 4 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.

Virginia Nail and Iron Works, Virginia Nail and Iron Works Company, J. P. Williams, Receiver, 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, and removed in 1890; 6 double puddling furnaces, one gas and 3 coal heating furnaces, 2 spike machines, and 3 trains of rolls (10, 18, and 20-inch); water-power; product, guide iron, round, square, and flat bar iron, and spikes; annual capacity, 10,000 net tons. Brand, "Virginia." Idle since February, 1891. *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; Albert C. Bruce, Secretary and Treasurer. Number of rolling mills and steel works in Virginia: 8 completed, 1 nearly completed, and 4 building. Of these 1 has a Bessemer steel plant.

ROLLING MILLS AND STEEL WORKS COMMENCED BUT NOT COMPLETED.

Buena Vista Steel Company, Buena Vista, Rockbridge county. Philadelphia office, Bullitt Building. Part of foundations built in 1891 for a basic open-hearth steel plant of two 15-gross-ton furnaces and a 26-inch blooming mill. Work suspended.

Glasgow Rolling Mill, Glasgow Rolling Mill Company, Glasgow, Rockbridge county. Began in 1891 the erection of a rolling mill with machinery from the Lawrence Iron Works, of Ironton, Ohio; equipment to consist of 18 puddling furnaces and 4 trains of rolls (19, 16, 10, and 8-inch); product to be bar and band iron and small T rails. Geo. T. Scott, President and Treasurer; G. F. Thomas, Secretary. Work suspended until the spring of 1892.

Salem Rolling Mill Company, Salem, Roanoke county. Began in 1891 the erection of a rolling mill for the manufacture of muck bar and

cotton-ties; buildings completed, and part of machinery on the ground; company made an assignment and work stopped. J. J. Bright, President; J. W. Womelsdorf, Secretary.

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 muck bar; annual capacity, 350,000 kegs. Fuel, bituminous coal. 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, 3 gas heating furnaces, 2 trains of rolls, (one muck and one 3-high skelp,) and 173 nail machines; product, steel cut nails, muck bar, and skelp iron; annual nail-manufacturing capacity, 410,000 kegs. Fuel used, bituminous coal. A. W. Campbell, 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 puddling furnaces, 3 heating furnaces, and 9 trains of rolls (pairs, including bar and muck); product, sheet iron exclusively; annual capacity, 13,000 net tons. Use natural gas exclusively. N. E. Whitaker, President; A. C. Whitaker, Secretary.
- La Belle Iron Works, Wheeling. Built in 1852, and enlarged since; incorporated December 3, 1875; 24 single puddling furnaces, 2 gas heating furnaces, 2 trains of rolls, (20-inch muck and 2-high 20-inch plate,) and 177 nail machines; product, steel nails, steel sheet bars, and muck bar; annual capacity, 400,000 kegs of nails, 8,500 net tons of steel sheet bars, and 13,500 net tons of muck bar; make muck bar for market. Brand, "La Belle." Fuel used, bituminous coal. (One 3-high 24-inch mill not in use.) C. A. Robinson, President; J. E. Wright, Secretary; W. H. Travis, General Manager.
- Riverside Iron Works, Wheeling. Works in Wheeling, Ohio county, extending across county line into Benwood, Marshall county. Built in 1859, and enlarged since; 23 single puddling furnaces, 13 heating furnaces, 224 nail machines, one hammer, and 8 trains of rolls (one 9, one 12, two 20, three 21, and one 32-inch); product, bar steel, light T rails, skelp, tack plate, and steel nails exclusively; annual capacity, 80,000 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, 100,000 net tons

of ingots. Tube works built in 1887 for the manufacture of all kinds of steel and wrought-iron tubes from $\frac{1}{2}$ inch to 10 inches; first tube made August 11, 1887; annual capacity, 50,000 net tons. Brand, "Riverside." Fuel used, manufactured gas and coal. J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Furnaces in West Virginia and in Ohio.*

Top Mill, Wheeling Iron and Nail Company, Wheeling. Built in 1867, and rebuilt in 1872; 8 single puddling furnaces, 6 gas heating furnaces, 2 softening furnaces, 2 annealing furnaces, 130 nail machines, and 3 trains of rolls (double muck and nail-plate and one 22-inch sheet train of 2 mills); product, iron and steel sheets and steel cut nails and spikes; annual capacity, 4,000 net tons of sheets and 300,000 kegs of nails and spikes. Brand, "Top Mill." Fuel used, bituminous coal. C. R. Hubbard, President; H. H. Hornbrook, Vice-President and Secretary. *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, and one 2-high 36-inch blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 110,000 net tons of ingots or 100,000 tons of slabs, billets, and blooms. Brand, "W. S. W." Fuel used, coal. A. J. Clarke, President; Charles T. Arnberg, Superintendent.

Number of rolling mills and steel works in West Virginia: 7. Of these 2 make Bessemer steel.

KENTUCKY.

Anchor Iron and Steel Works, 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 management. John Phillips, Superintendent of mill. Owned by the Estate of L. M. Dayton, John W. Herron, Executor, 68 Vine st., Cincinnati, Ohio.

Ashland Steel Company, Ashland, Boyd county. Built in 1891; two 5-gross-ton Bessemer steel converters, two 4-hole gas-fired soaking pit furnaces, and one blooming mill; first blow made December 26, 1891; product, billets and slabs; daily ingot capacity, 300 net tons. I. A. Kelly, President; John Russell, Vice-President; B. H. Burr, Secretary; E. C. Means, Treasurer.

Ewald Iron Company, 941 North Second st., St. Louis, Mo. Two mills: Tennessee Rolling Works, at Tennessee Rolling Works, Lyon county, built in 1846; 6 single puddling furnaces, 13 knobbling fires, 6 heating furnaces, 3 trains of rolls, and one hammer; annual ca-

capacity, 4,000 net tons; not in operation. 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 (8, 12, 18, 100-inch plate, and 72-inch plate and sheet 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; Thomas Shaver, Superintendent.

Licking Iron Works, Licking Rolling Mill Company, Covington. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 2 scrap furnaces, 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; I. Droege, Jr., 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. Charles J. Tranter, President; James Tranter, Vice-President; George M. Clark, Treasurer; James A. Sebastiani, Secretary.

Newport Rolling Mill Company, Newport, Campbell county. Built in 1857; 8 single puddling and 10 heating furnaces, 4 box annealing furnaces, and 5 trains of rolls (1 forge and 4 sheet); product, iron and steel sheets for roofing and corrugating purposes and stove-pipe iron; annual capacity, 15,000 net tons. Formerly called Swift's Iron and Steel Works. (The remainder of the former equipment of these works in furnaces and trains of rolls is abandoned and being torn down.) A. L. Andrews, President; W. F. Gaff, Secretary; L. T. Hubbard, Superintendent and General Manager; J. A. Andrews, Sales and Contracting Agent. *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, steel nails; annual capacity, 250,000 kegs. Brand, "Norton." Charles H. Greene, President; Thos. M. Adams, Vice-President; E. E. Seaton, Secretary; John Russell, Treasurer. Charles L. Colburn, Agent, No. 3 Johnston Building, Cincinnati. *See Furnaces.*

Watts (The) Steel and Iron Syndicate Limited, Middlesborough, Bell county. Began in 1890 the erection of steel works to contain seven 25-gross-ton basic open-hearth furnaces, two 4-hole soaking pits, and one 32-inch blooming mill; product to be billets and slabs; estimated annual capacity, 80,000 net tons. Works almost completed. Edmund Hannay Watts, Chairman, and R. A. Andrews, Secretary, London, England; Edgar Watts and Frank Watts, Managing Directors in America; George L. Reis, General Manager. *See Furnaces.*

Number of rolling mills and steel works in Kentucky: 8 completed, and 1 nearly completed. Of these 1 makes Bessemer steel, 1 makes open-hearth steel, and 1 open-hearth steel plant is nearly completed.

TENNESSEE.

Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 10 single and 3 double puddling furnaces, 2 gas heating furnaces, 41 nail machines, and 4 trains of rolls (8, 15, 16, and 18-inch); product, merchant bars, iron and steel nails, railroad and boat spikes, fish-plates, bolts, and light T and street rails; annual capacity, 12,000 net tons, including 75,000 kegs of nails. O. A. Brown, President and Treasurer; T. I. Stephenson, Secretary.

Lookout Iron Company, Harri-man, Roane county. Works built at Chattanooga, and first started in October, 1876; removed to Harri-man in 1891, and put in operation in September, 1891; 20 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (18-inch muck and 8 and 16-inch bar); product, bar iron, 12 to 30-lb. T rails, fish-plates, and light sections of angle and channel iron; annual capacity, 18,000 net tons. Sol. Simpson, President; W. H. Russell, Vice-President; J. D. Roberts, General Manager and Treasurer.

Southern (The) Iron Company, Nashville. Works (formerly owned by Roane Iron Company) at 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; remodeled by present company in 1890 for producing basic open-hearth steel; first basic steel made September 15, 1890. Puddle mill, built in 1869, removed and one 5-ton Bessemer converter built in 1886-7; first blow made May 7, 1887; utilized in 1891 for experiments in producing basic Bessemer steel; first basic Bessemer steel made August 24, 1891. A. M. Shook, President and General Manager; R. Ewing, Vice-President; W. E. McNeilly, Secretary and Treasurer; Percy Warner, Assistant General Manager. *See Coke and Charcoal Furnaces in Tennessee and Charcoal Furnaces in Alabama.*

Southern (The) Steel Works, John Leighton & Sons, 610 Boyce st.,

Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883; one single puddling furnace, one heating furnace, two 8-pot crucible steel-melting furnaces, and one 2,000-pound hammer; product, crucible cast steel; also forgings.

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. Company failed in 1890. Works sold under foreclosure proceedings to the Atlantic Trust Company, of New York. Idle.

Number of rolling mills and steel works in Tennessee: 5. Of these 2 make Bessemer steel, 1 makes open-hearth steel, and 1 makes crucible steel.

GEORGIA.

Atlanta Iron and Steel Castings Company, 50 Old Capitol Building, Atlanta, Fulton county. Built three furnaces in 1891 for converting iron castings into steel by the Bates process. Plant nearly completed.

Rome Cotton Tie Manufacturing Company, Rome, Floyd county. Built in 1889, and put in operation in July, 1889; 4 double puddling furnaces, 2 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 net tons. (Formerly operated by the Rome Rolling Mill Company.) J. King, President; James Cartwright, General Manager.

Number of rolling mills and steel works in Georgia: 1 completed rolling mill, and 1 steel plant nearly completed.

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. T. J. Peter, President. *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; 23 single puddling furnaces, 2 gas heating furnaces, and 3 trains of rolls (18-inch muck and 8 and 16-inch bar); product, bars, bands, hoops, light T rails, etc.; annual capacity, 15,000 net tons. W. J. Behan, President; W. H. Hassinger, Vice-Presi-

dent and General Manager; D. M. Forker, Secretary and Treasurer. Anniston Rolling Mills, Anniston Rolling Mills Company, Anniston, Calhoun county. Built in 1890-1, but not put in operation; 12 single puddling furnaces, 2 large heating furnaces, and 2 trains of rolls (20-inch 3-high muck and 12-inch 3-high finishing); steam connections and shafting not yet finished. Robert Frazer, President, Columbus, Miss.; W. E. Robertson, Secretary and Treasurer, Anniston. For sale. 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, 5 trains of rolls, (20-inch muck, 8-inch guide, 16-inch bar, 22-inch sheet, and 26-inch plate,) and 3 Siemens producers; product, bar, guide, plate, and sheet iron; annual capacity, 30,000 net tons. Owned by Morris Adler and others, who bought works at register's sale November 2, 1891.

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. James G. Caldwell, President; B. du Pont, Secretary; Thomas Ward, General Manager; J. D. Dwyer, Superintendent.

Fort Payne Rolling Mill, Fort Payne, DeKalb county. Commenced in 1889 the erection of a basic open-hearth steel plant and necessary machinery for the production of merchant bars, light rails, nails, and shapes; work suspended in February, 1891. Works at present contain two 15-gross-ton basic open-hearth furnaces, 4 gas heating furnaces, one 32-inch reversing blooming mill, one 22-inch train of nail plate rolls, and 5 nail machines. (The 9 and 16-inch trains of rolls were sold and removed to Denison, Texas.) The nail-plate train of rolls and nail machines are for sale. T. P. Randall, President; J. A. Wilder, Vice-President; G. E. Lathrop, Secretary and Treasurer.

Henderson Steel and Manufacturing Company, Birmingham, Jefferson county. Built in 1889-90; one 15-gross-ton basic open-hearth steel furnace; first steel made April 24, 1890; product, ingots; annual capacity, 9,000 net tons. (This furnace takes the place of one experimental Henderson open-hearth furnace built in 1887-8, and first steel made February 27, 1888.) J. W. Bush, President; J. A. Montgomery, Vice-President; George W. Gogin, General Manager; H. F. Wilson, Secretary; L. Rogan, Treasurer.

Shelby Rolling Mill Company, Helena, Shelby county. Works started

in March, 1873; enlarged by present company in 1889; 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, Treasurer. Company failed; works idle.

Southern Rolling Mill, Birmingham Railway Supply Company, Birmingham. Built in 1888-9, using part of machinery formerly in Nashville Iron Company's works, at Nashville, Tenn.; 25 single puddling and 3 heating furnaces and 3 trains of rolls (3-high 18-inch muck, 3-high 12-inch bar, and 3-high 12-inch guide); product, merchant bar iron; daily capacity, 60 net tons. Also operates bolt and nut works. H. M. Caldwell, President; W. J. Milner, Secretary; John London, Treasurer; J. P. Johns, Superintendent.

United States Rolling Stock Company, A. Hegewisch, Receiver, Anniston, Calhoun county. Built in 1884, and enlarged in 1888-9; 9 double puddling furnaces, 5 heating furnaces, one scrap furnace, 3 trains of rolls, (18-inch muck and 10 and 18-inch bar,) and 5 hammers (one 6,000-lb., two 4,000-lb., and two helve); product, car axles and merchant bar iron; annual capacity, 12,000 net tons. (Works formerly called Anniston Rolling Mill.) A. Hegewisch, President, Thomas F. B. Parker, Secretary, and C. Benn, Treasurer, 35 Wall st., New York; C. D. Roys, Vice-President, Rookery Building, Chicago; C. D. Allis, Assistant Treasurer, and W. H. Chaddock, Superintendent, at the works; B. F. Peacock, Superintendent of rolling mill and forge.

Number of rolling mills and steel works in Alabama: 10. Of these 2 have basic open-hearth steel plants.

TEXAS.

Denison (The) Rolling Mill Company, Denison, Grayson county. Built in 1891; expects to go into operation in January, 1892; one Siemens heating furnace and 2 trains of rolls (one 3-high 9-inch and one 3-high 16-inch); product, merchant iron and cotton-ties. J. T. Munson, President; J. C. Feild, Vice-President; J. H. Fairbanks, Secretary and Treasurer; J. M. Duncan, Superintendent of mill.

Lone Star Iron Company, Jefferson, Marion county. Building a rolling mill to contain 15 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (18-inch muck and 8 and 12-inch bar); product, bar and band iron and cotton-ties. Expects to complete works in the spring of 1892. John A. Kruse, President and Manager, Rookery Building, Chicago, Ill.; J. H. Cunningham, Vice-President; Edw. Atfield, Secretary; Thomas L. Nelson, Treasurer. *See Furnaces.*

Texas Iron Rolling Mill, Tyler, Smith county. Building a rolling mill

with machinery from mill partly erected at Fort Worth in 1890; 3 heating furnaces and 2 trains of rolls (one 9 and one 18-inch); product to be merchant bars, cotton-ties, rail splices, bolts and nuts, etc. J. L. Taft, President; G. E. Beach, General Manager.

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, and fish-plates; annual capacity, 5,000 net tons. Idle since 1888. Samuel Allen, President; T. W. House, Treasurer; G. C. Street, Secretary.

Number of rolling mills in Texas: 2 completed, and 2 building.

OHIO.

LAKE COUNTIES.

American Wire Company, Cleveland, Cuyahoga county. 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; one Belgian rod mill, with 4 gas producers, 3 heating furnaces, and 4 trains of rolls; one continuous rod mill, with 3 gas producers, 2 heating furnaces, and 3 trains of rolls; product, steel wire rods; annual capacity, 75,000 net tons. The company also operates a wire-drawing plant. Thomas Jopling, President and Treasurer; Samuel Andrews, Vice-President; R. F. Jopling, General Manager; A. B. Manship, Secretary.

Baackes Wire Nail Company, Cleveland, Cuyahoga county. A wire-drawing plant and 100 nail machines built in 1890-1; a rod mill in course of erection; product, wire rods, wire, and wire nails; annual capacity, 40,000 net tons of rods, 40,000 tons of wire, and 600,000 kegs of nails. C. B. Lockwood, President; M. Baackes, Vice-President; O. G. Kent, Secretary and Treasurer.

Britton Iron and Steel Company, Cleveland, Cuyahoga county. Built in 1853; rebuilt in 1873 and 1891; 6 single puddling and 6 knobbling furnaces, 10 heating furnaces, 5 trains of rolls, (one 18, three 22, and one 29-inch,) and one hammer; product, black and galvanized iron and steel plates and sheets; annual capacity, 10,000 net tons. Fuel used, coal, producer gas, and crude oil. Contemplate erecting two 20-ton open-hearth steel furnaces and a universal mill for heavy plates. Frank Rockefeller, President; Samuel A. Sague, Vice-President; L. H. Severance, Secretary and Treasurer.

Britton (The) Rolling Mill Company, 64 Hoyt ave., Cleveland, Cuyahoga county. Built in 1890-1, and started in May, 1891; 3 heating furnaces and one 24 in. by 72 in. train of rolls; product, iron and steel plates and heavy sheets; annual capacity 6,000 net tons. Fuel used, coal. J. W. Britton, President; F. W. Britton, Vice-President and General Manager; C. R. Britton, Secretary; A. M. Britton, Treasurer. *See Tinplate Works.*

Cleveland Hardware Company, Lake st., between Belden and Kirtland sts., Cleveland. Built in 1879; destroyed by fire in June, 1891, and entirely rebuilt; one heating furnace, with Smith & Laughlin gas producer, and one 10-inch train of rolls; product, shapes for wagon, carriage, and sleigh hardware, rolled from muck bar and steel; annual capacity, 8,500 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, Cuyahoga county. Bessemer steel works built in 1867-8; first blow made October 15, 1868; two 10-gross-ton converters; annual capacity, 180,000 net tons of ingots. Open-hearth steel works built in 1876-8; two 15-gross-ton and two 7-gross-ton open-hearth furnaces; annual capacity, 40,000 net tons of ingots. Blooming mill built in 1881, and remodeled in 1891; 2 soaking pits and 2 trains of rolls (one 2-high 33-inch reversing and one 3-high 23-inch); annual capacity, 250,000 net tons of blooms, billets, and slabs. Rail mills built in 1857; 5 heating furnaces and one train of rolls; annual capacity, 100,000 tons of rails. Three rod mills with 5 trains of rolls; annual capacity, 125,000 tons. Wire mills, built in 1868, have an annual output of 50,000 tons of finished wire. Structural and bar mills contain one 22-inch structural train of rolls, one 18-inch and one 12-inch bar train, one 9-inch guide and merchant train, and one hoop mill; annual capacity, 55,000 net tons of merchant bars and shapes. Plate mills consist of 6 single puddling furnaces, 9 heating furnaces, 2 busheling furnaces, 8 knobbling fires, and 4 trains of rolls (one 21-inch muck, two 21-inch sheet, and one 21-inch plate); galvanizing works attached; annual capacity, 15,000 tons. The company also has a foundry, a forge, machine shops, barb-wire-fence manufactory, and blast furnaces. Product, Bessemer and open-hearth blooms, billets, and slabs, beams, channels, angles, and all other structural shapes, Bessemer steel rails, small T and tram rails, steel wire rods, merchant, spring, toe-calk, and sleigh-shoe steel, steel tires, hoops, and forgings, wire, plain and barbed, steel boiler and tank plate, galvanized and black sheet iron, and corrugated roofing and siding. Oil and gas made from oil used largely as fuel. William Chisholm, President; W. B. Chisholm, Vice-President; E. S. Page, Secretary; Henry Grey, Superintendent. *See Furnaces.*

H. P. Nail Company, Cleveland, Cuyahoga county. Built in 1880, and first put in operation in March, 1880; enlarged in 1891; 2 large gas heating furnaces, one 9-inch, one 12-inch, and one 16-inch train of rolls, and 302 wire-nail machines; product, steel wire nails, staples, steel wire rods, and steel wire; annual capacity, 1,000,000 kegs of wire nails and 48,000 net tons of rods or wire. Galvanizing plant connected with the works, with an annual capacity of 5,000 net tons of wire. Fuel used, coal gas in heating furnaces and fuel oil under boilers.

S. H. Chisholm, President; C. B. Beach, Vice-President; E. C. Beach, Secretary.

Lake Erie Iron Works, Lake Erie Iron Company, 155 St. Clair st., Cleveland, Cuyahoga county. 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, carbuilders, and for agricultural implements. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; F. R. Scofield, Superintendent of 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 9 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; O. A. Bostwick, Vice-President; H. S. Young, Secretary and Treasurer; C. A. Borts, Superintendent.

Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Built in 1873-4, and put in operation January 1, 1875; 2 rotary puddling furnaces, 14 Siemens heating furnaces, 9 hammers, seven 15-gross-ton open-hearth steel furnaces, and 3 trains of rolls (one 30 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.

Union Rolling Mill Company, Perry-Payne Building, Cleveland. Works at Newburgh, Cuyahoga county. Built in 1866-7; 19 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; H. A. Fuller, Secretary and Treasurer; Charles Kennedy, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Lake counties: 10 completed, and 1 building. Of these 2 make both Bessemer steel and open-hearth steel.

MAHONING VALLEY.

Akron Iron Company, Akron, Summit county. Built in 1866; 19 single puddling furnaces, one scrap furnace, 5 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, 16,000 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.

Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863, 1874, and 1890; 42 single and 14 double puddling furnaces, 10 heating furnaces, (3 using producer gas,) and 10 trains of rolls (3 muck trains, and one 6, one 7, three 8, one 10, and one 16-inch finishing train); product, hoops, bands, horse-shoe iron, bar iron, guide iron, shapes, and steel cotton-ties; annual capacity, 60,000 net tons. Brands, "C., McC. & Co." and "Eagle." Fuel used, coal. Myron C. Wick, President; W. E. Taylor, Secretary and Treasurer. *See Rolling Mills in Ohio River district.*

Coleman (The) Shields Company, Niles, Trumbull county. Built in 1841; 22 single puddling furnaces, 3 heating furnaces, and 2 trains of rolls (20-inch muck and 24-inch plate); product, pipe casing and tube iron; annual capacity, 10,000 net tons. J. Morgan Coleman, President; Henry B. Shields, Vice-President; James D. Shields, Secretary and Treasurer.

Falcon Iron and Nail Company, Niles, Trumbull county. Two mills: Falcon Iron and Nail Works, built in 1867; 19 single puddling furnaces, 11 heating furnaces, 2 scrap furnaces, 4 box annealing furnaces, 44 nail machines, and 5 trains of rolls, (two 20 and three 22-inch.) Russia Sheet-Iron Mills, built in 1864; 23 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, 30,000 net tons of skelp iron, and 12,000 net tons of sheet iron, sheet steel, and galvanized iron. Warner Arms, President; Tod Ford, Vice-President; Myron I. Arms, Secretary and Treasurer.

Falls Hollow Staybolt Company, 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, patent mandrel-rolled hollow stay-bolt iron; annual capacity, 2,000 net tons. Formerly called Stirling Works.

Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Built at Niles, Trumbull county, in 1872, and removed to Haselton, a suburb of Youngstown, 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, 40,000 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, 59 Dearborn st., Chicago; Eastern office, 15 White Building, Buffalo, N. Y. *See Furnaces.*

Hubbard (The) Iron Company, Hubbard, Trumbull county. Telegraph address, Youngstown. First put in operation in November, 1872; 5 double and 11 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 18-inch); product, merchant bar iron; specialty, horse-shoe bar and bolt and nut iron; annual capacity, 17,000 net tons. H. O. Bonnell, President; W. Scott Bonnell, Vice-President; Wm. F. Bonnell, Secretary and Treasurer.

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Built in 1846; 40 single and 42 double puddling furnaces, 19 heating furnaces, 50 nail machines, 6 spike machines, and 13 trains of rolls (4 muck, one sheet, two 8, two 10, one 12, one 18, and two 20-inch); 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, coal and producer gas, the latter for heating furnaces. J. F. Taylor, Receiver's Agent, and John I. Williams, General Superintendent, Youngstown; Charles H. Hawkins, Receiver's Agent, Chicago. *See Mahoning Valley Furnaces.*

Mahoning Valley Works, The Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; 3 single and 30 double puddling and 8 coal and 4 gas 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.*

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. Erecting a new sheet mill. William Summers, President; S. Summers, Secretary and Treasurer.

Youngstown Iron and Steel Company, Youngstown, Mahoning county. Three mills, two in Trumbull county and one in Mahoning county: Girard Mill, at Girard, Trumbull county, built in 1872, and put in operation September 1, 1873; 27 single puddling furnaces, 3 Smith

regenerative gas heating furnaces, and 4 trains of rolls (20-inch muck, and 7, 8, and 10-inch finishing); 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, Trumbull county, built in 1870, burned in 1878, and rebuilt in 1879; 28 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (20-inch muck, and 10 and 20-inch finishing); product, bar and skelp iron, shafting, etc.; annual capacity, 20,000 net tons. (The above mills formerly operated by the Trumbull Iron Company.) Youngstown Mill, at Youngstown, Mahoning county, built in 1871, and burned and rebuilt in 1877; 28 single puddling furnaces, 2 Smith gas heating and 4 coal heating furnaces, one tire-straightening machine, and 5 trains of rolls (20-inch muck, and 7, 8, 10, and 12-inch finishing); product, bar, hoop, band, hame, box, tongue-cap, and tire iron and steel, and cotton-ties; annual capacity, 25,000 net tons. (Formerly operated by the Youngstown Rolling Mill Company.) Henry Wick, President; George D. Wick, Treasurer and General Manager; Wm. H. Baldwin, 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 of washed metal, 45,000 net tons. Fuel used, producer gas. Tod Ford, President and General Manager; Paul Jones, Vice-President; John Stambaugh, Jr., Secretary and Treasurer; E. L. Ford, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Mahoning Valley: 15.
Of these 1 has an open-hearth steel plant.

INTERIOR COUNTIES.

Cambridge (The) Iron and Steel Company, Cambridge, Guernsey county. Built in 1889-90, and put in operation in July, 1890; contains 9 single puddling furnaces, one scrap furnace, one gas and 8 coal heating furnaces, and 5 trains of rolls (one 22-inch muck, three 22-inch sheet, and one 24-inch sheet); product, sheet iron and sheet steel; annual capacity, 9,000 net tons. Brand, "Cambridge." Fuel used, coal. A. Beyer, President; A. W. Brown, Vice-President and General Manager; M. G. McMahon, Secretary and Treasurer.

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 open-hearth steel furnaces; first open-hearth steel made August 17, 1875; product, tool steel, cast steel, and spring steel; annual ca-

capacity, 12,000 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 (8, 16, and 18-inch); product, muck bar and merchant bars; annual capacity, 15,000 net tons. J. H. King, President; S. E. Welker, Secretary; C. N. Schmick, Treasurer. *See Furnaces.*

Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus, Franklin county. Built in 1854; 2 single and 7 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, merchant bars, light T rails, and iron for harness and saddlery work and for all kinds of chains; annual capacity, single turn, 11,000 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.

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. Contemplates enlarging the works. 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.

Kellogg (The) Seamless Tube and Manufacturing Company, Findlay, Hancock county, Eastern office, 40 Water st., Boston. Built in 1888, and enlarged in 1891; one 10-gross-ton and one 25-gross-ton open-hearth steel furnace, one heating furnace, and 2 continuous 16-inch trains of rolls with 5 sets of rolls in each train; product, weldless steel tubes. Fuel used, natural gas. Howes Norris, President, and W. F. Almy, Treasurer, Boston; Benjamin Butterworth, Vice-President, Cincinnati; Charles H. Twist, Manager, Findlay.

Lancaster Iron Company, Lancaster, Fairfield county. Commenced in 1889 the erection of a rolling mill to contain 2 double and 16 single puddling furnaces, 2 forge fires, 5 heating furnaces, and 4 trains of rolls (18-inch muck and 8, 10, and 16-inch finishing); part of the machinery taken from Middlesex Rolling Mill in Pennsylvania. Work suspended, and plant sold to a committee appointed by the creditors. Sold again late in 1891 to the Indiana Iron Company, which intends to remove the machinery to Muncie, Indiana, and erect a rolling mill there.

Massillon Rolling Mill, Joseph Corns & Son, Massillon, Stark county. Built in 1873, and put in operation January 4, 1875; 5 single puddling furnaces, 3 scrap 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, shapes to pattern and iron for agricultural implements; annual capacity, 10,000 net tons.

New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Built in 1883; 20 single puddling furnaces, 4 heating furnaces, and 7 trains of rolls; product, sheets and plates. Fuel used, coal exclusively. George Reeves, President and Treasurer; Albert Reeves, Secretary.

Piqua (The) Rolling Mill Company, Piqua, Miami county. Built in 1889; 6 single puddling furnaces, 2 heating furnaces, 3 pair furnaces, 3 softening furnaces, 3 annealing furnaces, and 4 trains of rolls (one 3-high 22-inch muck and three 22-inch sheet); product, iron and steel sheets; annual capacity, 6,500 net tons. Fuel used, natural gas. J. G. Battelle, President and General Manager; W. P. Orr, Vice-President; James Hicks, Secretary and Treasurer; Frank Danks, Superintendent.

Reeves Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6; first iron rolled in February, 1866; 19 single puddling furnaces, 2 coal and 2 gas heating furnaces, 4 trains of rolls, (3-high 20-inch muck, and 8, 10, and 20-inch finishing, 4 sheet and one cold rolling mill,) and complete galvanizing and pickling plant; product, merchant bar iron, light T rails, and black and galvanized and cold-rolled sheet iron and sheet steel; annual capacity, 35,000 net tons. Formerly called Dover Rolling Mill. Jeremiah Reeves, General Manager; Jabez Reeves, Superintendent.

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 cold rolls, and 2 hammers (6,000-lb. and 8,000-lb.); product, "Craig" polished sheet steel, similar to Russia sheet iron, made from purchased sheets; annual capacity, 600 net tons. Fuel used, natural gas under boilers and crude oil in heating furnaces. Intend enlarging works.

Solid Steel Company, Alliance, Stark county. One 3-gross-ton and one 5-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. Works also contain a small experimental Bessemer converter. J. K. Bole, President; S. J. Williams, Treasurer; W. A. Blanchard, Secretary; C. W. Roepper, Superintendent.

Springfield (The) Steel Casting Company, Springfield, Clarke county. Crucible steel works of one 12-pot steel-melting furnace built in 1890, and started in July, 1890; product, steel castings; annual capacity, single turn, 300 net tons. J. W. Maxwell, President; G. H. Vincett, Secretary.

United States Wire Nail Works, United States Steel Company, Jackson, Jackson county. Built in 1887-8; 2 Smith gas heating furnaces, 2

forge fires, and 60 nail machines; product, wire and wire nails; annual capacity, 300,000 kegs. Draw wire from purchased rods. Contemplate building in 1892 a complete rod mill. (This company has absorbed the plant of the Jackson Steel and Nail Mill Company.) David C. Bryan, President, 36 Bryan's Block, Indianapolis, Ind.; C. W. Constantine, Vice-President; D. A. Chenoweth, Secretary and Treasurer; O. W. Kelly, Assistant Secretary.

Wellston Steel and Nail Mill, E. J. Bird, Jr., Ironton. Works at Wellston, Jackson county. Built in 1886; 2 heating furnaces, one 22-inch train of rolls, and 65 nail machines; product, steel nails; annual capacity, 160,000 kegs. Idle.

Wetherald Rolling Mill Company, Findlay, Hancock county. Built in 1887; 2 single puddling furnaces, 3 large scrap furnaces, 2 heating furnaces, and 2 trains of rolls (10 and 18-inch); product, bar, band, and heavy hoop iron; annual capacity, 6,000 net tons. Fuel used, natural gas exclusively. (Formerly owned by the Findlay Iron and Steel Company.) A. L. Wetherald, Manager.

Whitely Steel Works, Springfield, Clarke county. Built in 1886, and put in operation in October, 1886; 7 heating furnaces, 3 trains of rolls, (9 and 12-inch and one cold-rolling train,) and 2 nail machines; steel department, added in 1888, contains one 8-gross-ton open-hearth furnace; product, rods, flats, squares, shapes, cold-rolled iron and steel, steel nails, etc.; annual capacity, 9,000 net tons. Idle.

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 one double and 19 single puddling furnaces, one scrap furnace, 3 coal and 3 gas 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 iron and steel merchant bars and light iron and steel T rails; specialty, agricultural irons; annual capacity, 15,000 net tons. M. Churchill, President; E. B. Greene, Vice-President; John R. Cary, Secretary; C. D. Greene, Treasurer. *See Furnaces.*

Number of rolling mills and steel works in the interior counties: 16 completed, and 1 nearly completed but to be removed. Of these 1 makes Bessemer steel, 5 make open-hearth steel, and 1 makes crucible steel.

OHIO RIVER COUNTIES.

Ætna Iron and Steel Company, Bridgeport, Belmont county. Built in 1873, and put in operation January 1, 1874; enlarged in 1883 and 1891; 31 single puddling furnaces, 2 scrap furnaces, 6 regenerative gas and 6 reverberatory heating furnaces, 7 sheet mill softening furnaces, 6 box annealing furnaces, and 11 trains of rolls (one 20-inch

muck, one 8 and one 9-inch guide, one 16 and one 24-inch bar, all 3-high; three 20 and two 22-inch sheet, and one 24-inch large jobbing sheet); product, iron and steel bars, sheets, plates, bands, light T and street rails, angles, tees, channels, and miscellaneous shapes; annual capacity, 50,000 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 gas heating furnaces, 2 trains of rolls, and 126 nail machines; product, nails of iron and steel and of combined iron and steel; annual capacity, 300,000 kegs. John G. Peebles, President; B. H. Burr, Vice-President and Superintendent; S. G. Gilfillan, 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; annual capacity, 90,000 net tons. Fuel used, coal. James Wilson, President; A. B. Carter, Secretary and Treasurer. *See Furnaces.*

Brilliant Steel and Iron Company, Brilliant, Jefferson county. Main office, Wheeling, W. Va. Rolling mill started in September, 1883; 20 single puddling furnaces, 4 gas heating furnaces, 4 trains of rolls, (8, 12, 18, and 20-inch,) and one hammer; product, iron and soft steel bars, bands, and light T rails; annual capacity, 18,000 net tons. Fuel used, natural gas. George K. Wheat, President; Alex. Updegraff, Secretary; Andrew U. Wilson, General Manager.

Burgess Steel and Iron Works, Portsmouth, Scioto county. Two works: Burgess Steel and Iron Works, built in 1871; 3 single puddling furnaces, 13 heating furnaces, one 24-pot crucible steel-melting furnace, one 8-gross-ton and one 10-ton open-hearth steel furnace, 5 trains of rolls, and 5 steam hammers; product, plow steel, (open-hearth, 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, 25,000 net tons. Portsmouth Iron and Steel Works, built in 1832; 16 single puddling furnaces, 7 heating furnaces, 6 trains of rolls, and 1 hammer; iron products, plates, sheets, bars, hoops, railroad spikes, small T rails, splice bars, and bolts; annual capacity, 11,000 net tons. One 10-gross-ton open-hearth steel furnace, built in 1879; rebuilt to a 25-ton furnace in 1891; steel products, boiler plate, spring steel, etc.; annual capacity, 10,000 net tons of ingots. George Davis, President;

J. L. Watkins, Jr., Secretary and Treasurer; and L. D. York, Superintendent.

Cartwright, McCurdy & Co., Youngstown. Works at Pomeroy, Meigs county. Built in 1847; 14 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one muck, and one 7, one 8, and one 12-inch finishing); product, hoop, band, and refined iron, and steel cotton-ties; annual capacity, 22,000 net tons. Fuel, coal. (Formerly called Pomeroy Rolling Mill.) *See Rolling Mills in the Mahoning Valley.*

Cincinnati Rolling Mill Company, 298 E. Pearl st., Cincinnati. Works at Riverside, Hamilton county. Built in 1880, enlarged in 1882, and being remodeled by present company; 10 single puddling furnaces, 10 heating furnaces, 4 box annealing furnaces, 2 pair furnaces, one 4-ton hammer, and 6 trains of rolls (one muck, one 3-high 70-inch plate, 3 sheet, and one cold-rolling train); product, iron and steel sheets and black plates for tinning; annual capacity, 15,000 net tons. W. T. Simpson, President; James N. Gamble, Vice-President; R. Simpson, Secretary; S. M. Goodman, Treasurer.

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 puddling furnace, 2 heating furnaces, one scrap furnace, 5 sheet furnaces, 2 pair furnaces, 4 annealing furnaces, and 5 trains of rolls (one bar and four 22-inch sheet); also tinning plant, added in 1891, containing 6 tinning stacks with necessary fittings; product, Juniata and B. B. galvanized sheet iron, plain cold-rolled refined iron, soft sheet steel, pickled and cold-rolled steel for all purposes, and tin and terne plates; annual capacity, 4,600 net tons of sheets and 50,000 boxes of tin and terne plate. Fuel used, coal. John C. Wallace, Chairman; H. T. Duff, Secretary; William Banfield, Treasurer and Manager. *See Tinplate Works.*

Ironton Rolling Mill, The Eagle Iron and Steel Company, Ironton, Lawrence county. Built in 1852, and enlarged several times since; 22 single puddling furnaces, 4 heating, 2 softening, and 2 annealing furnaces, and 5 trains of rolls (one muck, one 3-high bar, one 3-high 8-inch, one 38-inch sheet, and one 44-inch fire-bed sheet); product, bar and sheet iron and steel and light iron and steel rails; annual capacity, double turn, 13,000 net tons. H. A. Marting, President; S. B. Steece, Vice-President; F. C. Tomlinson, Secretary and Treasurer; Lewis Jones, Manager.

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 3 gas heating furnaces, one 21-inch train of plate rolls, and 160 nail machines; product, exclusively steel nails; annual capacity, 400,000 kegs. Brand, "Jefferson." Fuel used, coal. S. K. Wallace, President; W. H. McClinton, Vice-President and Manager; G. P. Harden, Secretary. *See Furnaces.*

Junction Iron Company, Mingo Junction, Jefferson county. Branch office, Wheeling, W. Va. Built in 1882, and put in operation November 1, 1882; 3 gas heating furnaces, one train of rolls, and 142 nail machines; product, steel cut nails and spikes and steel tack plate, made from steel supplied by the Laughlin and Junction Steel Company, of which this company is one-half owner; annual capacity, 350,000 kegs. Brand, "Junction Iron Co., Wheeling." Fuel used, natural gas, producer gas, and raw coal. H. M. Priest, President; George A. Dean, Superintendent. *See Furnaces.*

Kelly (The) Nail and Iron Company, Ironton, Lawrence county. Built in 1883, and first put in operation November 1, 1883; 14 single puddling furnaces, 2 heating furnaces, 2 forge fires, 2 trains of rolls, and 119 nail machines; product, iron and steel cut nails and spikes; annual capacity, double turn, 250,000 kegs. William D. Kelly, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer. *See Furnaces.*

Laughlin and Junction Steel Company, Mingo Junction, Jefferson county. Branch office, Wheeling, W. Va. Built in 1885-6; two 5-gross-ton Bessemer converters; made first blow February 8, 1886; 5-hole soaking pit, 4-door gas heating furnace, and blooming mill; product, slabs, billets, and blooms for general purposes; annual capacity, 100,000 net tons. Fuel used, coal and producer gas. (This company is operated by the Junction Iron Company and the Laughlin Nail Company.) W. L. Glessner, and H. M. Priest, General Managers; M. J. Urquhart, Secretary and Business Manager; W. H. Bradley, Superintendent.

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Built in 1872-3; first keg of nails made March 4, 1873; works destroyed by fire August 8, 1881, but immediately rebuilt; 3 gas heating furnaces, one train of 20-inch rolls, 2 hammers, and 225 nail machines; product, cut nails and spikes, made from steel supplied by the Laughlin and Junction Steel Company, of which this company is one-half owner; annual capacity, 600,000 kegs. Fuel used, coal. W. L. Glessner, President; T. R. Thomas, Secretary.

Middleport Steel and Nail Works, The King, Gilbert, and Warner Company, Columbus. Works at Middleport, Meigs county. Commenced to make nails February 22, 1886; 3 heating furnaces, 2 trains of rolls, (20 and 24-inch,) and 102 nail machines. Bessemer steel plant added in 1887; two 4-gross ton converters and one 28-inch blooming train of rolls; first blow made in August, 1888. Product, steel slabs, billets, and nails; annual capacity, 80,000 net tons of steel and 300,000 kegs of nails. R. M. Gilbert, President; J. H. King, Vice-President; R. S. Warner, Secretary and Treasurer. *See Furnaces.*

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-inch, three 20-inch sheet, one 22-inch sheet, and one 3-high 24-inch plate); product, plate iron and steel and sheet iron and steel, either black, painted, or galvanized, and flat, corrugated, crimped, or beaded; annual capacity, 15,000 net tons. Adding four 22-inch sheet mills and 4 pair, 4 softening, and 3 double annealing furnaces, which will increase the capacity of the works to 25,000 net tons per annum. Fuel used, natural gas in part. L. S. Delaplain, President; W. T. Graham, Secretary.

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, 5 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, 5,000 net tons. Fuel used, natural gas and coal. Persifer 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: 18. Of these 3 make Bessemer steel, 2 make open-hearth steel, and 1 makes crucible steel.

Total number of rolling mills and steel works in Ohio: 59 completed, 1 nearly completed but to be removed, and 1 building. Of these 6 make Bessemer steel, 10 make open-hearth steel, and 2 make crucible steel.

INDIANA.

American (The) Tin Plate Company, Elwood, Madison county. Building a rolling mill to contain 4 tin mills and 4 pairs of cold rolls for producing black plates for tinning purposes. A. L. Conger, President; John F. Hazen, Vice-President; Charles S. Tarlton, Secretary; W. B. Leeds, Treasurer; E. Stanford, Manager. *See Tinplate Works.*

American (The) Wire Nail Company, Anderson, Madison county. Built in 1889; 3 heating furnaces, one rod mill, and 100 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 45,000 net tons of rods and 300,000 kegs of nails. Fuel used, natural gas. (Wire-nail plant brought from Covington, Ky., in 1891.) L. H. Gedge, President; C. P. Gorvey, Secretary; E. J. Buffington, Treasurer.

Anderson (The) Rolling Mill Company, Anderson, Madison county. Built and put in operation in 1891; 2 heating furnaces and 2 trains of rolls (8 and 9-inch); product, bar iron. Fuel, natural gas. G. B. Wenham, President; V. O. Foulk, Secretary; E. B. Putnam, Superintendent.

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, 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; J. H. Lewis, Treasurer; A. S. Farber, Acting Secretary. *See Furnaces.*

Chicago Horse Shoe Company, East Chicago, Lake county. Office, Rookery Building, Chicago. 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. Robert L. McCook, President; Zenas Burns, Secretary and Treasurer.

Greenfield Iron and Nail Company, Greenfield, Hancock county. Built in 1889 with machinery formerly in Cobb's Iron and Nail Works, at Aurora; 4 heating furnaces, one 22-inch train of rolls, and 50 nail machines; product, iron and steel cut nails; annual capacity, 150,000 kegs. Fuel used, natural gas. Franklin Landers, President; W. C. Whitehead, Secretary and Treasurer.

Haugh-Kurtz Steel Company, Indianapolis. Works at Anderson, Madison county. Building a steel plant of one 10-gross-ton open-hearth furnace; to be completed early in 1892; product to be ingots, billets, and castings. Fuel, natural gas. B. F. Haugh, President; J. A. Kurtz, Vice-President; W. E. Kurtz, Secretary and Treasurer; Samuel Morris, Superintendent.

Indiana Iron Company, Muncie, Delaware county. Building a rolling mill to be supplied with machinery from the Lancaster Iron Company's rolling mill at Lancaster, Ohio; 2 double and 20 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls (18-inch muck, 16-inch bar, and 10-inch guide); product to be bar and guide iron and bolts and nuts. Fuel, natural gas. L. A. Cobb, President; George O. Cromwell, Vice-President and Treasurer; George M. Bard, Secretary; D. H. Corbett, Superintendent of mill.

Irondale (The) Steel and Iron Company, Anderson, Madison county. Built in 1889-90 with 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, sheet iron; annual capacity, 10,500 net tons. Fuel, natural gas. G. R. Root, President and General Manager; C. V. Erdmann, Secretary.

Ivanhoe Rolling Mill Company, Room 306 Stock Exchange Building,

Chicago, Ill. Foundations built and frame work erected for a rolling mill at Ivanhoe, Lake county; to contain 2 double puddling furnaces, 4 heating furnaces, and one 18 and one 9-inch train of rolls for the production of bar iron and bolts and nuts. Fuel to be petroleum. Work suspended until spring. E. J. Adams, Secretary and Treasurer; F. A. Marriott, Manager.

Lakeside Nail Company, 647 Rookery Building, Chicago, Ill. Works at Hammond, Lake county. Built in 1886-7; 4 gas heating furnaces, 2 trains of rolls, (22-inch slab and 22-inch nail plate,) and 202 nail machines; product, cut nails; annual capacity, 600,000 kegs. George A. Griscom, President; T. F. Woodman, Secretary and Treasurer. (The works contain a Bessemer steel plant of two 3-gross-ton converters; first blow made November 22, 1887. Idle. Formerly called East Chicago Steel Works. Owned by the Chicago Steel Manufacturing Company.)

Midland (The) Steel Company, Muncie, Delaware county. Building an open-hearth steel plant and rolling mill; to contain one 24-gross-ton open-hearth steel furnace, 7 heating and 3 annealing furnaces, and 3 trains of rolls (one blooming mill and two 24-inch trains); product to be billets and plates and sheets. Fuel, natural gas.

Muncie Nail Company, Muncie, Delaware county. Built in 1888-9 with part of machinery removed from Greencastle; put in operation in March, 1889; 10 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 12,000 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 Works, Weaver, Getz & Co., Chicago. Works at East Chicago, Lake county. 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 forgings; annual capacity, 25,000 net tons. Fuel used, coal and petroleum. (Formerly owned by the National Forge and Iron Company.)

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 2 gas heating furnaces, 3 forge fires, 3 trains of rolls, (10, 18, and 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. B. Whitney Herr, 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, 15 heating furnaces, 2 annealing furnaces, 3 spike machines, 2 Archer oil-gas producers, and 6 trains of rolls (one 18-inch muck, one 21-inch structural, one 16-inch bar, one 10-inch bar, and two 24-inch sheet); product, T rails, (8 to 25 lbs.,) tram rails, street rails, bars, angles, fish-plates, spikes, washers, iron and steel channels for cars, steel slot beams for cable roads, and sheet iron and sheet steel; annual capacity, 35,000 net tons. C. W. DePauw, President; N. T. DePauw, Vice-President; Albert Trinler, 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.

Oliver Chilled Plow Works, South Bend Iron Works, proprietors, South Bend, St. Joseph county. Crucible steel plant built in 1891 for the production of steel solely for use in the works in the manufacture of plows; 96 pots can be used at each heat.

Premier Steel Company, Indianapolis, Marion county. Built in 1857, 1881-2, and 1886-7, and remodeled by present company in 1890-1; one double and 11 single puddling furnaces, 7 heating furnaces, 4 trains of rolls, (one muck, one blooming, and one 18 and one 26-inch finishing,) one Adams direct process furnace, and two 15-gross-ton open-hearth steel furnaces; first steel made in May, 1887; product, muck bar, steel billets and bars, and steel I beams and architectural shapes. C. W. DePauw, President; N. T. DePauw, Vice-President; Albert Trinler, Treasurer; W. H. Coen, Secretary. (The production of steel beams and architectural shapes at these works is controlled by the Indiana Steel Company, of Indianapolis. C. W. DePauw, President; W. H. Coen, General Manager; W. V. Martin, Treasurer.)

Schulte, Lohoff & Co., Evansville, Vanderburgh county. Built in 1887-8; three 10-pot steel-melting holes, 4 annealing ovens, 10 forge fires, 8 hammers, and 2 large presses for making solid steel articles; product, crucible steel, used by the firm in the manufacture of edge tools. Frank Lohoff, Manager.

Terre Haute Iron and Steel Company, Terre Haute, Vigo county. Built in 1868; destroyed by fire September 19, 1873, and rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double and 16 single puddling furnaces, 2 regenerative gas heating furnaces, and 3 trains of rolls (one 19-inch muck, one 18-inch bar, and one 10-inch guide); product, bar iron; annual capacity, 18,000 net tons. Works also contain 64 nail machines, which are idle. (Formerly owned by the Terre Haute Iron and Nail Works.) J. P. Crawford, President;

A. J. Crawford, Vice-President and Treasurer; Samuel L. Bridwell, Secretary.

Wabash Iron Company, Terre Haute, Vigo county. Completed in January, 1874; one double and 15 single puddling furnaces, one scrap and 3 heating furnaces, and 3 trains of rolls (8, 18, and 20-inch); product, all kinds of bar and guide iron and light T rails; annual capacity, 12,000 net tons. Brand, "Wabash." Fuel, coal. A. J. Crawford, President; J. P. Crawford, Secretary, Treasurer, and Manager.

Westerman (The) Natural Gas Iron Company, Marion, Grant county. Built in 1890-1 with machinery from the abandoned Prospect mill at Cleveland, Ohio; 4 heating furnaces and 2 trains of rolls; product, bar iron; annual capacity, 11,000 net tons. Brand, "Westerman." Fuel used, natural gas. George Westerman, President and Superintendent; Daniel E. Brong, Vice-President; S. N. Gallup, Secretary and Treasurer.

Number of rolling mills and steel works in Indiana: 18 completed, 1 partly built, and 4 building. Of these 1 has a Bessemer steel plant, 1 makes Robert-Bessemer steel, 1 makes open-hearth steel, and 2 open-hearth steel plants are being built, and 2 make crucible steel.

ILLINOIS.

Atkinson Steel and Spring Works, Rookery Building, Chicago. Works at Harvey, Cook county. Spring works removed from Chicago to Harvey (a suburb of Chicago) in 1891, immediately after the erection in that year of an open-hearth steel plant and rolling mill; two 15-gross-ton open-hearth steel furnaces, one heating furnace, and one 3-high 12-inch train of rolls; product, steel for consumption in the spring shops of the works. F. M. Atkinson, President.

Belleville Steel and Iron Nail Works, 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. Idle.

Belleville Steel Company, Belleville, St. Clair county. Office, 415 Locust st., St. Louis. Two works: One plant built in 1869-70, and remodeled in 1886-7; 7 heating furnaces, 3 trains of rolls, (22, 18, and 12-inch,) and two 4-gross-ton Bessemer steel converters; first blow made August 6, 1887; product, 12 to 40-lb. rails, billets, slabs, shafting, bars, flats, fish-plates, etc.; annual capacity, 60,000 net tons. (Formerly operated by Waugh Steel Works.) The other plant built in 1882, and remodeled in 1885-6; two 3-gross-ton Clapp-Griffiths steel converters, one gas and 2 coal heating furnaces, one 23½-inch slab train, one 3-high 21-inch nail-plate train, and 154 nail machines; steel works made first blow January 21, 1886; product, steel nails; annual capacity, 25,000 net tons of steel ingots and 350,000 kegs of nails. (Formerly operated by the Western Nail Company.) T. A. Meyenburg,

President; W. W. Waugh, Vice-President; B. S. Adams, Secretary; F. W. Oliver, Treasurer.

Calumet Works, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at Cummings, Cook county. First put in operation in August, 1876; 38 single puddling furnaces, 6 scrap and 6 heating furnaces, 3 trains of rolls, (9, 14, and 22-inch,) and 132 nail machines; use gas made by Siemens producers; product, merchant bar iron and iron and steel nails; annual capacity, 50,000 net tons of bar iron. 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. Steel plant and nail machines not in use. Wm. B. Howard, President; H. A. Howard, Vice-President; Irving T. Hartz, Secretary.

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 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; E. S. Condit, Jr., Acting Secretary; F. Kohl, Treasurer.

Chicago Forge and Bolt Company's Rolling Mill, Fortieth st. and Stewart ave., Chicago. 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. (Formerly operated by the Straight Fiber Iron Company.)

Chicago Splice Bar Mill, Morris Sellers & Co., Phoenix Building, 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 14-inch rolls (one 2-high and one 3-high); manipulate Bessemer steel rail ends; product, plow beams, harrow teeth, steel cultivator sleeves, shovel backs, and squares, diamonds, rounds, tees, angles, and shapes for agricultural implements; annual capacity, 15,000 net tons. Use petroleum for heating furnaces and under boilers. E. Buckingham, President; J. Buckingham, Vice-President; E. H. Buckingham, Treasurer and General Manager; R. H. Buckingham, Secretary.

Chicago Tire and Spring Company, Phoenix Building, Chicago. Works at Melrose, (Maywood P. O.,) Cook county. Tire mill built in 1881-2; new mill built in 1888; 2 heating furnaces and one universal tire

mill; product, locomotive and car-wheel tires and all kinds of rings. Steel department, added in 1884-5, contains one 8-gross-ton open-hearth furnace; first steel made in February, 1885; product, ingots and castings, also manganese steel; annual capacity, 6,144 net tons. Spring works have furnaces, rolls, and machinery for making railroad car springs. Fuel used, coal and petroleum. C. H. Ferry, President and Treasurer.

Fowler Rolling Mill, Fowler Rolling Mill Company, 185 Dearborn st., Chicago. Works at 59th st. and C. & W. I. R. R., 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 at Stony Island ave. 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. H. W. Fowler, President and Treasurer; S. A. Brown, Vice-President; Joseph Grove, Secretary.

Illinois Steel Company, Rookery Building, Chicago. Milwaukee office, 151 New Insurance Building; New York office, 46 Wall st. Four plants in Illinois, styled the North Works, South Works, Joliet Works, and Union Works. North Works, located at Chicago, on the north branch of the Chicago river, at the foot of Wabansia ave., built in 1857; 8 heating furnaces and 3 trains of rolls; 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, rails, and beams; annual capacity, 156,000 net tons of ingots, 125,000 tons of rails, and 50,000 tons of beams, which last would come out of rail capacity. South Works, located at South Chicago; three 10-gross-ton Bessemer converters, 10 Siemens heating furnaces, one 3-high 40-inch blooming train, and two 3-high finishing trains of rolls; made first blow June 14, 1882; product, Bessemer steel ingots and rails; annual capacity, 480,000 net tons of ingots and 400,000 tons of rails. These works are to be extended by the addition of an open-hearth steel plant of four 15-gross-ton furnaces and a plate mill. Joliet Works, located at Joliet, Will county, built in 1870; 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 10 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 three gas furnaces; annual capacity, 60,000 net tons. Union Works, located at 3179 Ashland ave., 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, 4 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 of ingots and 300,000 tons of rails. Use oil for fuel at South Works and at Union Works. Jay C. Morse, President; W. R. Stirling, 1st Vice-President; H. S. Smith, 2d Vice-President; the above three officers, with Norman Williams, of Chicago, and A. J. Forbes-Leith, of New York, constitute the Executive Committee; H. A. Gray, Secretary; W. A. Green, Assistant Secretary; J. C. Stirling, Treasurer; Robert Forsyth, Engineer; J. L. Yale, General Sales Agent; J. B. Yale, Assistant General Sales Agent, New York; L. D. Doty, Purchasing Agent; J. H. Long, Manager freight department. Officers at the various works in Illinois: North Works, F. H. Treat, Superintendent, and Charles F. Abbott, Auditor; South Works, W. R. Walker, Manager, D. S. Mathias, Superintendent, E. A. S. Clarke, Assistant Superintendent, and R. H. Ismon, Auditor; Union Works, J. C. Walker, Superintendent, W. C. Catlin, Assistant Superintendent, and Gard Maynard, Auditor; Joliet Works, Charles Pettigrew, Superintendent, M. B. Smith, Assistant Superintendent, and J. F. Wilson, Auditor. *See Furnaces in Illinois. See Furnaces and Rolling Mills in Wisconsin.*

Joliet Sheet Rolling Mill Company, Joliet, Will county. Building a rolling mill to contain 2 pair, 4 reheating, and 2 double annealing furnaces and 2 trains of 22-inch rolls for the production of steel sheets. L. F. Beach, President; E. H. Stewart, Vice-President; F. W. Werner, Secretary; Fred. Sehring, Treasurer; Samuel Fewtrell, General Manager.

Lewistown Works, Pioneer Tinplate Company, Joliet, Will county. Began in 1891 the erection of a rolling mill to contain 4 heating furnaces and 5 trains of rolls (2 for hot rolling and 3 for cold rolling) for the manufacture of black plates for tinning; estimated annual capacity, 4,000 net tons. J. Davis Lewis, Manager. *See Tinplate Works.*

Norton Brothers, 44 River st., Chicago. Works at Maywood, Cook county. One open-hearth steel furnace and buildings for a rolling mill erected in 1890-1; experimenting with fluid-metal rolling machinery for the production of steel sheets for tinning. *See Tinplate Works.*

Peoria Rolling Mill, Illinois Bolt and Nut Company, Peoria, Peoria

- county. Completing the rolling mill commenced in 1889 by the Peoria Rolling Mill Company; 4 double puddling furnaces, 7 heating furnaces, 6 trains of rolls, and one hammer; product to be merchant bars and bolt and nut iron.
- Plano Rolling Mill, Plano, Kendall county. First put in operation January 1, 1885; 2 heating furnaces and one 12-inch train of rolls; product, steel shapes for agricultural implements; annual capacity, 6,000 net tons. Idle. Owned by A. H. Sears and E. L. Henning.
- 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, 30,000 net tons of bar iron and 12,000 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. Built to dispose of accumulated wrought scrap iron and to furnish material needed in the construction of the arsenal. Idle.
- St. Louis Steel Foundry Company, 509 Olive st., St. Louis. Works at East St. Louis, St. Clair county. Steel plant built in 1891, consisting of one 4-gross-ton basic Bessemer converter and one 6-ton basic open-hearth furnace; converter not in operation; first open-hearth steel made in September, 1891; product, steel castings and ingots. Thomas Howard, President; Rolla Wells, Vice-President and Treasurer; Edward F. Goltra, Secretary.
- Springfield Iron Company's Iron and Steel Works, The Springfield Iron Company, Springfield. Chicago office, 710 Phoenix 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; first steel ingot made 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 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 13 Siemens heating furnaces and 5 trains of rolls, (two 12, one 16, 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. Fuel used in all heating furnaces, Siemens producer gas, except in five furnaces in bar mill No. 1, which are supplied with gas made by the Hennin process, a plant of 5 Hennin gas producers having been built in 1891. The Hennin process recovers tar and ammonia as by-products, and was discovered and developed at these works. Charles Ridgely, President; William Barret Ridgely, Vice-President; H. H. Cust, Secretary; John Griffiths, Superintendent.

Tudor Iron Works, 415 Locust st., 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, 10 automatic and 8 hand spike machines, 3 bolt headers, 5 bolt cutters, 3 nut tappers, and 5 nut machines; product, railroad splices, T rails, bar iron, bolts, and spikes; annual capacity, 50,000 net tons. Brand of spikes, "Tudor." T. A. Meysenburg, President; B. S. Adams, Secretary; F. W. Oliver, Treasurer.

Waukegan Iron and Steel Castings Company, Waukegan, Lake county. One furnace built in 1891 for converting iron castings into steel by the Bates process; expects to begin operations in February, 1892; product to be draw-bars and general railroad castings. C. R. Rothwell, President and Treasurer; A. G. Clark, Secretary; Ed. Lamb, Superintendent.

Waukegan Works, Washburn and Moen Manufacturing Company, Waukegan, Lake county. Main office, Worcester, Mass.; Chicago office, 107 and 109 Lake st. Built in 1891; 4 coal and 2 regenerative gas heating furnaces and 4 trains of rolls; product, wire rods and wire; annual capacity, 100,000 net tons. *See Rolling Mills and Steel Works in Massachusetts.*

Western Tube Company, (formerly Haxtun Steam Heater Company,) Kewanee, Henry county. Built in 1883, and put in operation in November, 1883; 2 double and 3 double-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 pipe; annual capacity, 15,000 net tons. The company manufactures everything used in the construction of steam heating apparatus for all kinds of buildings. J. H. Pierce, President; E. E. Baker, Vice-President and Treasurer; Edw. Worcester, Secretary; A. M. Hewlett, Assistant Treasurer.

Number of rolling mills and steel works in Illinois: 26 completed, and 3 building. Of these 8 have Bessemer steel plants, 1 has a Clapp-Griffiths steel plant, 1 makes Robert-Bessemer steel, 6 make open-hearth steel, and 1 is prepared to make special steel.

MICHIGAN.

Detroit Steel and Spring Works, Detroit Steel and Spring Company, Michigan and Hubbard avenues, Detroit. First put in operation in May, 1882; 7 Swindell and 4 double Weber heating furnaces, 2 trains of rolls, (9 and 18-inch,) and 8 hammers; product, merchant steel and elliptic and spiral springs of all kinds for railroad and other purposes; annual capacity, 8,000 net tons. Crucible steel department made first steel in February, 1884; one 30-pot crucible steel-melting furnace; product, tool and spring steel; annual capacity, 2,500 tons. Robert-Bessemer department built in 1889, and put in operation in July, 1889; two 2-gross-ton converters; made first blow July 11, 1889; product, ingots and castings. (Robert-Bessemer plant first operated under name of Michigan Steel Works.) Fuel used in works, producer gas and petroleum. T. H. Newberry, President and Treasurer; Charles P. Choate, Vice-President; Allen W. Atterbury, Secretary; M. D. W. Loomis, Manager; J. S. Newberry, Assistant Manager.

Eureka Iron and Steel Works, City Railway Building, 12 Woodward ave., Detroit, Wayne county. Works and general offices, Wyandotte, Wayne county. Built in 1855; 6 double and 2 single puddling furnaces, 6 forge fires, 8 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 of plates and 24,000 tons of bars. Formerly called Wyandotte Rolling Mills. W. K. Muir, President, and S. D. Miller, Vice-President and Secretary, Detroit; W. Van Miller, Treasurer, J. S. Van Alstyne, Agent, and William Patterson, Superintendent, Wyandotte. *See Furnaces.*

Michigan Forge and Iron Company, (successors to Baugh Steam Forge Company,) Detroit, Wayne county. Office, No. 1 Newberry Building. Forge built in 1870, rolling mill in 1877; 13 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; W. C. McMillan, General Manager; John B. Baugh, General Superintendent. Samuel A. Baugh, Superintendent; W. K. Anderson, Treasurer; Robert D. Field, Secretary.

Muskegon Iron and Steel Company, Muskegon, Muskegon county. Rolling mill built and put in operation in 1890; 3 scrap furnaces and three 3-high trains of rolls (18-inch bar and billet, 12-inch, and 9-inch); open-hearth steel plant added in 1891; first steel made in December, 1891; one 15-gross-ton furnace completed and one 15-ton furnace building; plant arranged for operation in connection with the Adams direct process; product, merchant bars and agricultural machinery steel; annual capacity, 20,000 net tons. Fuel used, bitu-

minous coal. S. T. Williams, President; W. H. Thompson, Vice-President and Superintendent; W. F. Ayers, Secretary and Treasurer. Number of rolling mills and steel works in Michigan: 4. Of these 1 makes both Robert-Bessemer and crucible steel and 1 makes open-hearth steel.

WISCONSIN.

Illinois Steel Company, Rookery Building, Chicago, Ill., and 151 New Insurance Building, Milwaukee, Wis. Milwaukee Works, at Bay View, Milwaukee, built in 1868 and 1874, and nail mill added in 1884; 8 quadruple puddling furnaces, 19 coal and 6 gas heating furnaces, 8 trains of rolls, (one 8, two 9, one 12, two 18, one 21, and one 22-inch,) and one hammer; product, light rails, merchant bar iron and steel, and fish-plates; annual capacity, 80,000 net tons of bar iron and steel and 40,000 tons of fish-plates, etc. Petroleum used for fuel under boilers. (Nail machines sold in 1891.) Officers at Milwaukee Works: Francis Hinton, Manager; O. W. Gay, Cashier; C. S. Otjen, Superintendent; J. H. Price, Auditor; S. J. Llewellyn, Sales Agent. *See Furnaces in Wisconsin. See Furnaces and Rolling Mills in Illinois.*

West Superior Iron and Steel Company, West Superior, Douglas county. Built in 1890-1; two 4-gross-ton Bessemer steel converters, 4 heating furnaces, and 2 trains of rolls (one 30 x 90-inch train with 2 stands for plates and one 20-inch bar train); product, plates, structural shapes, and bars; annual capacity, 100,000 net tons of ingots and 90,000 tons of rolled material. James Roosevelt, President, Hyde Park, N. Y.; Francis H. Weeks, Secretary and Treasurer, 120 Broadway, New York; W. F. Mattes, General Manager, West Superior. *See Furnaces.*

Number of rolling mills and steel works in Wisconsin: 2. Of these 1 makes Bessemer steel.

MINNESOTA.

Duluth Manufacturing Company, Duluth, St. Louis county. Built in 1888-9, and put in operation in October, 1889; 4 heating furnaces, 5 gas producers, 2 trains of rolls, (10 and 18-inch,) and one 6,000-lb. and two 3,000-lb. hammers; product, bar iron, railroad fastenings, and axles and other forgings; annual capacity, 12,000 tons of rolled iron and 5,000 tons of forgings. Large car building shops and foundry form part of the company's works. L. G. Matthews, President; W. J. Matthews, Assistant to President; O. H. Simonds, Secretary; Stewart L. Woodford, Treasurer; F. H. Duesler, Auditor; R. L. Ettenger, Superintendent. (Formerly owned by the Minnesota Iron Car Company.)

Harris Forge and Rolling Mills, Harris Forge and Rolling Mill Company, Irondale, Ramsey county. Built in 1890-1, and put in opera-

tion in March, 1891; one single and 4 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, (18 and 10-inch,) and 2 hammers; product, bar iron, forgings, car axles, bolts, nuts, washers, and builders' and contractors' supplies; annual capacity, 18,000 net tons of finished iron. Fuel, petroleum.

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 gas 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. *See Tinplate Works.*

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 9 hammers; product, bar, rod, and band iron, coupling links and pins, car, tender, and locomotive axles, shafts, and all kinds of forgings for use of railroads, steamboats, and machine shops; annual capacity, 15,000 net tons. James Green, President; Geo. S. Edgell, Vice-President; G. L. Goetz, Secretary. Selling agents, John S. Brewer, 176 Jackson st., Chicago, Ill.; H. C. McNair, Drake's Block, St. Paul, Minn.

Kansas City Bolt and Nut Company, Kansas City. Works at Sheffield, Jackson county. Built in 1887-8, and first put in operation in January, 1889; one heating furnace and one 10-inch train of rolls; product, bar and bolt iron; also bolts, nuts, spikes, etc.; annual capacity, 6,000 net tons of bar iron and 3,000 tons of bolts, nuts, etc. Fuel used, producer gas in rolling mill and petroleum in bolt works. (Branch of Reading Bolt and Nut Works, of Reading, Pa.) J. H. Sternbergh, President, Reading, Pa.; I. C. Howes, Vice-President and Treasurer, and R. C. Howes, Secretary, Kansas City.

St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, 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-melting cupolas, 4 spiegel-melting cupolas, 40 gas producers, 10 Siemens heating furnaces, one 3-ton hammer, one 33-inch blooming train, one 24-inch billet train, and one 24-inch rail train; product, steel slabs, blooms, billets, and rails; annual capacity, 100,000 net tons ingots. (Formerly called Vulcan Works.) E. A. Hitchcock, President; O. L. Garrison, Secretary and Treasurer. Idle. *See Furnaces.*

St. Louis Steam Forge and Iron Works, corner Main and Miller sts., St. Louis. Built in 1862; one double puddling furnace, 4 forge fires, 10 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 6 hammers; product, bar iron, car axles, and railroad and steam-boat forgings of iron or steel; annual capacity, 10,000 net tons of axles and forgings and 2,500 net tons of bar iron. G. C. McDonald, President; C. L. McDonald, Secretary and Treasurer.

Union Steel and Iron Company, St. Joseph, Buchanan county. Built in 1889; 2 gas heating furnaces, 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. Works not yet put in operation. Began the erection in 1889 of two 3-gross-ton Robert-Bessemer steel converters; not yet completed. Wm. Haven, President; George T. Walker, Vice-President and Manager; W. N. McCandlish, Secretary and Treasurer.

Number of rolling mills and steel works in Missouri: 6. Of these 1 has a Bessemer steel plant, and 1 Robert-Bessemer steel plant is partly built.

IOWA.

Holcomb-Brown Iron Company, Burlington, Des Moines county. Put in operation in 1885; enlarged in 1887; 2 coal and 2 gas heating furnaces, 2 trains of 3-high rolls, (9 and 16-inch,) and one 5,000-lb. hammer; product, hammered merchant bar, heavy and light bands, car irons, horse-shoe bar, stay-bolt iron, steel buggy tire, steel for jail bars, and agricultural irons of all kinds; specialty, small shapes; annual capacity, double turn, 25,000 net tons. (Formerly owned by the Iowa Rolling Mill Company.) Richard Brown, President; John G. Foote, Vice-President; John F. Holcomb, Secretary and Treasurer; H. G. Hamilton, Superintendent.

Number of rolling mills in Iowa: 1.

COLORADO.

Colorado Coal and Iron Company, Pueblo, Pueblo county. Works at Bessemer, near Pueblo. New York office, 45-47 Wall st. Built in 1881-2; extensive improvements made in 1889 and 1891; converting department made its first blow April 11, 1882; two 5-gross-ton Bessemer converters, 3 pig iron and 2 spiegel melting cupolas, 2 gas-fired soaking pits, 2 Siemens bloom-heating furnaces, one 3-high 35-inch blooming train, one 3-high 23-inch rail train, one single and 7 double puddling furnaces, one 20-inch muck train, one 20-inch bar train, one 9-inch guide train, and railroad spike and bolt and nut machines; product, standard steel rails, bar iron, mine rails, splice

bars, railroad spikes, and bolts and nuts; annual capacity, 100,000 net tons of steel rails, 12,000 net tons of bar iron, mine rails, and splice bars, and 30,000 kegs of railroad spikes, bolts, and nuts. Also operates a cast-iron pipe foundry, with an annual capacity of 20,000 net tons. (Rolling mill at Denver, built in 1888, has been abandoned.) Officers at New York: Edward J. Berwind, President; Thomas E. H. Curtis, Secretary and Treasurer. Officers at Pueblo: Henry S. Grove, Vice-President; E. M. Steck, General Manager; J. A. Writer, Acting Auditor; W. L. Graham, Assistant Secretary and Cashier; Independence Grove, Superintendent of iron and steel works; Geo. S. Ramsay, General Superintendent of mines. *See Furnaces.*

Trinidad Rolling Mill, Trinidad, Las Animas county. Built in 1888-9, and started in April, 1889; 2 scrap heating furnaces and 2 trains of rolls (8 and 12-inch); product, rounds, half-rounds, squares, flats, and other forms of bars, and mine T rails; annual capacity, 8,000 net tons. (Owned by the Trinidad Rolling Mill Company.) Operated during part of 1891 by Messrs. Hofius & Wick. Negotiations pending for the sale of the plant.

Number of rolling mills and steel works in Colorado: 2. Of these 1 makes Bessemer steel.

WYOMING.

Laramie Rolling Mills, F. E. Scrymser, lessee and manager, Laramie City, Albany county. Built in 1874-5, and put in operation in April, 1875; 10 heating furnaces and 2 trains of rolls, (10 and 19-inch,) and one 4,500-pound hammer; product, bar and rod iron, mine rails, nuts, bolts, spikes, and track fastenings; annual capacity, 20,000 net tons. Number of rolling mills in Wyoming: 1.

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 mill.

Judson Manufacturing Company, Oakland, Alameda county. Office and salesroom, 14-16 Fremont st., San Francisco. Built in 1882; 4 coal heating furnaces, one 4-door 7 x 18 gas heating furnace, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, bar iron, tack plate, tacks and fine lath nails, and agricultural shapes; annual capacity, 12,000 net tons of finished iron. Brand, "Judson." Egbert Judson, President; H. E. Bothin, Vice-President and Treasurer; John Gillson, Secretary; 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, and one nail-plate train, one hammer, 96 cut-nail machines, 22 wire-nail machines, and 20 barb-wire machines; product, wire nails, barb fence wire and market wire, iron nails, and steel nails from imported slabs; annual capacity, 340,000 kegs. Also makes nails of combined iron and steel. The company has a complete wire-drawing plant, with 32 blocks, and draws wire from imported rods. Herrmann J. Sadler, President and Treasurer; William Wright, Vice-President and General Manager; Wm. F. Mau, Secretary.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 202 Market st., P. O. Box, 2,032, San Francisco. Put in operation July 25, 1888; 4 single puddling and 17 heating furnaces, 8 trains of rolls, (one 8, one 10, one 12, three 18, one 28-inch blooming, and one 28-inch structural,) 4 spike and 2 rivet machines, 5 bolt headers, one pointer, 5 hot-press nut machines, 16 punching and straightening presses, 11 steam hammers, and 2 belt hammers; product, bar iron, angle iron, beams, channels, etc., shafting, 12 to 60-lb. iron and steel rails, railroad, ship, and boat spikes, bridge work, bolts, (all kinds except carriage,) nuts, washers, boiler rivets, horse-shoe shapes, car axles, and all kinds of railroad and ship forgings; total annual capacity, 30,000 net tons. Steel department added in 1884; one 5-ton and two 18-ton open-hearth steel furnaces; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. A horse-shoe company controlled by this company has been formed to operate in connection with these works. James G. Fair, President; C. M. Keeney, Secretary; Patrick Noble, Superintendent.

Number of rolling mills and steel works in California: 4. Of these 1 makes open-hearth steel.

PROJECTED.

At or near San Diego, San Diego county, by the San Diego Iron and Steel Company, a plant for making wrought iron by the Eames direct process; also a steel plant and rolling mill. Dr. C. J. Eames, Manager.

UNITED STATES.

Total number of rolling mills and steel works in the United States in January, 1892: 460 completed, 5 nearly completed but work suspended, and 18 building. Of these 46 have Bessemer steel plants, and 2 Bessemer steel plants are being built, 5 have Clapp-Griffiths steel plants, 4 have Robert-Bessemer steel plants, and 1 Robert-Bessemer steel plant is partly built, 71 have open-hearth steel plants, 1

open-hearth steel plant is nearly completed, and 4 open-hearth steel plants are being built, 45 have crucible steel plants, and 1 crucible steel plant is being built, 7 make blister steel, and 4 have plants for making special steel, and 1 special steel plant is nearly completed.

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. Where the names of companies or firms are mentioned with the works they are usually the names of the owners or lessees of the works when first placed in this list.

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.

Cambridge Rolling Mills, Gilmore & Eustis, Cambridgeport, Middlesex county. Built in 1868; burned and rebuilt in 1884; product, bars, shafting, rods, tires, and horse-shoe iron. Formerly called Boston Rolling Mills. Closed November 21, 1891, and not to be operated again as a rolling mill.

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.

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 iron and steel bars, plates, etc.; dismantled 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. Cut-nail machines operated by Tremont Nail Company.

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.

Tyler Steel Tube Company, 235 A st., South Boston, Mass. Works built in 1886 and rolling machinery added in 1889; removed to Washington, Pa., in 1889.

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.

Ausable Horse Nail Works, Ausable Horse Nail Company, Keeseville, Essex county. Built in 1869; product, nail rods, all worked into horse nails by this company. Rolling mill idle for many years.

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 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.
- Spuyten Duyvil Rolling Mill, Spuyten Duyvil, New York City. Rail mill built in 1863, and bar mill added in 1872; product, rails, fish-plates, and bar iron; idle since 1883, and abandoned.
- 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.
- Syracuse Iron Works, Syracuse, Onondaga county. Built in 1861; product, bar, wire-rod, band, and hoop iron, railroad and boat spikes, fish bolts, horse-shoe and bridge iron, and cotton-ties; works dismantled.
- 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.
- William W. Wood, Wood's Falls, Clinton county. Rolling mill built in 1879-80, and operated in connection with a forge; product, car axles and bar iron; dismantled in 1890.

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.
- Jersey City Steel Works, Jersey City, Hudson county; commenced operations August 1, 1862; abandoned.
- 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.
- Rockaway Rolling Mill, D. T. Warren, Rockaway, Morris county. First put in operation in May, 1886; product, blooms for steel purposes, from ore. Machinery removed in 1890, and works converted into an axe factory.

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.
- Brownsville Rolling Mill, Brownsville, Fayette county. Rolling mill completed December 1, 1873, and remodeled in 1889; product, skelp iron, merchant bar iron, and muck bar; dismantled.
- Carbon Rolling Mill, Weissport, Carbon county. Built in 1860-4, and rebuilt in 1872; product, all kinds of merchant iron; dismantled in 1887.
- Chickies Rolling Mill, Chickies Rolling Mill Company, Chickies, Lancaster county. Built in 1865; product, muck bar; idle, and not likely to be operated again.
- 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.
- Dalmatia Nail and Iron Works, Dalmatia, Northumberland county. Nail works first put in operation in March, 1887; buildings erected for a rolling mill department, but machinery never added.
- 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.
- Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware ave., Philadelphia. Built in 1845; product, nails, merchant bar, band, hoop, skelp, and angle iron, and steel plow, cultivator, and shovel plate; dismantled in 1891.
- 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.
- Little Schuylkill Rolling Mill, Port Clinton, Schuylkill county. Built in 1868; product, merchant bar, guide, tee, channel, and angle iron; torn down in 1891.
- 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.
- Standard Iron Company Limited, Norristown, Montgomery county. Built in 1857; product, puddled bars; dismantled in 1890.
- 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.

Delaware Iron Works, Wooddale, New Castle county, near Wilmington. Built in 1812; sold in 1891 to be converted into a paper mill.

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.

West Amwell Works, McCullough Iron Company, Elkton, Cecil county. Built in 1847; product, sheet iron; abandoned in 1890.

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.

Moundville Rolling Mill, Moundville, 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, lessee, Cleveland. Built in 1863; dismantled. Formerly operated by the Cleveland Iron Company.

Columbus Steel Company, 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; dismantled in 1890.

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.

Globe Rolling Mill Company, 413 West Front st., Cincinnati. Built in 1845; product, bar, angle, sheet, and plate iron; sold and dismantled in 1891.

Grasshopper Iron Works, The Arms, Bell & Co., Youngstown. Built in 1876; burned in January, 1886.

Lawrence Iron Works, Lawrence Iron and Steel Company, Ironton. Built in 1853; product, bar, band, chain, and hoop iron, cotton-ties, and light T rails; dismantled in 1891, and part of machinery removed to Glasgow, Va.

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.

Prospect Rolling Mill Company, Cleveland, Cuyahoga county. Built in 1888; product, merchant bar iron; dismantled in 1890, and machinery removed to Marion, Indiana.

Sandusky Rolling Mill, Sandusky, Erie county. Built in 1873. Ran last on steel rails from purchased blooms.

Steubenville Iron and Steel Company, Steubenville, Jefferson county. Built in 1871-2; product, muck bar and pipe iron. Formerly known as the Alikanna Rolling Mill; dismantled in 1891.

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, Indiana.

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, Illinois.

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.

St. Paul Rolling Mill, (formerly known as Capital Iron Works,) St. Paul, Ramsey county. Built in 1885-6. Idle since 1886, and machinery removed to Fort Worth, Texas, in 1890.

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.

Laclede Rolling Mills, Chouteau, Harrison, and Vallé Iron Company, 204 North Third st., St. Louis. Built in 1850 and rebuilt in 1879; product, bar, sheet, and plate iron and steel, blooms, angle and tee iron, small T rails, spikes, nuts, bolts, and washers; works dismantled in 1891.

La Grange Rolling Mills, La Grange, Lewis county. Built in 1883; dismantled and machinery removed to Findlay, Ohio, in 1887.

St. Louis Shovel Company, St. Louis. One train of rolls used for rolling bars into shovel blanks; rolls removed and for sale.

Tudor Iron Works, St. Louis. Built in 1870; machinery removed to the Tudor Iron Works, East St. Louis, Ill., about 1881.

KANSAS.

Topeka Rolling Mill, Topeka. Built in 1874; product, rails; burned in 1881.

Western Iron Company, Rosedale, Wyandotte county. Built in 1875; product, mine and street rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc; not likely to be again operated.

NEBRASKA.

Union Steel Nail Company, Omaha, Douglas county. Works built in 1879; 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.
- Ætna Iron and Steel Works, Crown Point, Lake county, Indiana. Built in 1886; product, steel castings.
- 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.
- Bookwalter Casting Company, Springfield, Clarke county, Ohio. Built in 1888-9; two 1½-gross-ton Robert-Bessemer steel converters used for experimental purposes.
- Boston Car-wheel Company, South Boston, Mass. 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 Crucible Steel Casting Company, Elston and Webster avenues, Chicago. Built in 1886, and removed to new works in 1888; open-hearth and crucible steel ingots and castings; burned in 1890, and abandoned as a steel plant.
- 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.
- Columbus Steel Company, Columbus, Ohio. Two 15-gross-ton open-hearth steel furnaces built in 1886-7; dismantled in 1890.
- Crane Iron Company, Catasauqua, Lehigh county, Pa. One 1½-ton experimental Robert-Bessemer steel converter, built in 1889; abandoned.
- Crescent Steel Company, Pittsburgh. Two 2-ton Bessemer converters, built in 1889; removed in 1890.
- Crucible Cast Steel Casting Company Limited, Pittsburgh. 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 crucible steel works in 1885; abandoned same year.
- Jefferson Iron Works, Steubenville, Ohio. Bessemer steel plant of two 3-ton converters, built in 1886-7; dismantled in 1890.
- Jersey City Steel Works, Jersey City, N. J. Crucible steel plant built in 1862; abandoned.
- Johnson Company, Johnstown, Cambria county, Pa. Four 12-pot crucible steel-melting furnaces, built in 1888.
- Joseph W. Howard Limited, corner Albany and Swett sts., Boston, Mass. First steel made in September, 1883; product, crucible steel castings.
- McCormick & Co., Harrisburg, Dauphin county, Pa. One 3-ton Clapp-Griffiths steel converter, built in 1886.
- Millvale Rolling Mill, Pittsburgh. Clapp-Griffiths converter removed from Port Henry, N. Y., in 1887, and shipped to Durango, Mexico, in 1888.
- Nellis's Agricultural Works, Pittsburgh. Built in 1870; product, crucible steel for springs; abandoned.
- 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 open-hearth furnaces; dismantled in 1889.
- Pittsburgh Steel Works, Ross st. and First ave., 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, and then to Durango, Mexico.
- Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two 3-ton Clapp-Griffiths converters; made first blow February 2, 1886; abandoned in 1890.
- 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 steel 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 direct from ore.

NEW YORK.

ALL LOCATED IN THE LAKE CHAMPLAIN DISTRICT.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Four works: Plattsburgh Iron Works, built at Plattsburgh in 1879 as a rolling mill; converted into a forge in 1883; 4 fires and one hammer. Chateaugay Lake Iron Works, built at Chateaugay Lake, Franklin county, in 1875; 16 fires and 3 hammers. Clayburgh Iron Works, built at Clayburgh, Clinton county, in 1844; rebuilt and enlarged in 1883; 7 fires and one hammer. Russia Iron Works, 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.*

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.*

Number of forges in New York: 9.

NEW JERSEY.

Steam Forge, P. W. Levering, lessee, Jersey City. Forge at Rockaway, Morris county. Built in 1878; 2 forge fires, one hammer, and one direct process furnace, for making wrought iron direct from ore; experiments commenced in 1891. Owned by B. B. Oram.

Number of forges in New Jersey: 1.

Total number of iron-ore forges in the United States: 10.

An experimental plant for the production of wrought iron direct from the ore by the Neville process was built at Harriman, Roane county, Tennessee, in 1891, but is not now in operation.

BLOOMARIES.

NOTE.—Under this title are embraced all works which hammer blooms from pig or scrap iron. Many plate, sheet, and rod 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.

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.

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.

Number of bloomaries in New Jersey: 2.

PENNSYLVANIA.

Boiling Springs Iron Company, 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. Formerly called Carlisle Iron Works. Idle. *See Furnaces.*

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. Peters 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, and again in 1891; 6 charcoal forge fires and one 2½-ton steam hammer; steam and water power; product, charcoal blooms for boiler tube and boiler plate iron; annual capacity, 2,500 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, Fort Hunter P. O., Dauphin county. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 9 forge fires, one run-out, and one steam hammer; product, blooms for boiler plate, sheet iron, wire, tube, skelp, tinplate, etc., made from pig and scrap iron; annual capacity, 6,000 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, David Knepper, Receiver, 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, Edward B. Wiestling. *See Charcoal Furnaces.*
- Spring City Bloom Works, 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. C. S. Francis, President; H. Coffin, Secretary; Henry Francis, Treasurer; H. S. Hallman, Manager.

Springton Forge, Wallace, Chester county. Built in 1790, and rebuilt in 1881; 4 forge fires, one run-out, and one steam hammer; water-power blast; product, charcoal blooms. Owned by Jerome Keeley, 303 Walnut st., Philadelphia. For sale or rent.

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Office, Harrisburg. Established in 1809, and rebuilt in 1870; 8 fires, one double run-out, and one hammer; the blast is operated by water-power and the hammer by steam-power; annual capacity, 5,000 net tons. *See Rolling Mills.*

Number of bloomaries in Pennsylvania: 14.

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, Principio Forge Company, lessee, Principio Furnace P. O., Cecil county. Telegraph address, Perryville. Built in 1883-4; 12 fires, one heating furnace, and one hammer; coke run-out attached; steam-power used throughout; product, charcoal blooms for boiler tubes, used by the Tyler Tube and Pipe Company, of Washington, Pa. N. E. Whitaker, President.

Number of bloomaries in Maryland: 2.

VIRGINIA.

Eagle Forge, G. L. Carter, lessee, Pulaski City. Forge at Crockett Depot, Wythe county. Built in July, 1882; 2 fires; product, bar iron for local use, made from pig iron. Idle. *See Charcoal Furnaces.*

Number of bloomaries in Virginia: 1.

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. Idle. *See Furnaces.*

Number of bloomaries in Alabama: 1.

Total number of pig and scrap bloomaries in the United States: 20.

ABANDONED FORGES AND BLOOMARIES.

MAINE.

O. S. Thomes, Cumberland Centre, Cumberland county. Forge at Webb's Mills. Built in 1883.

VERMONT.

East Middlebury Iron Works, East Middlebury, Addison county. Rebuilt in 1880. Idle since 1885.

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, G. W. & F. Palmer & Co., Alder Bend, Clinton county. Two forges, one at Altona, built in 1868, and one at Alder Bend, built in 1880; both abandoned.

Crown Point Iron Company, Ironville, Essex county. Built in 1828, and rebuilt in 1879; idle since 1886.

Horicon Iron Company's Forge, Ticonderoga, Essex county. Built in 1865; product, charcoal blooms for steel. Idle since 1883. Owned by H. G. Burleigh & Brother.

Irona Forge, J. F. Reynolds, Irona. Built in 1868; dismantled.

John Merchant's Forge, Schuyler Falls, Clinton county. Built in 1844.

Keene Forge, W. F. & S. H. Weston, Keene, Essex county. Built in 1880; abandoned in 1886.

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.

Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; abandoned.

Paradox Iron Works, Schroon River, Essex county. Built in 1864.

Peru Steel Ore Company Limited, Clintonville, Clinton county. Built in 1837; abandoned.

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 Radford, built in 1880; abandoned.

Stone Forge, Nichols & Hull, Plattsburgh, Clinton county. Built in 1835.

William W. Wood, Wood's Falls, Clinton county. Built in 1863, and rebuilt in 1872.

Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835; abandoned in 1883.

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; abandoned in 1886.

NEW JERSEY.

Bloomington Forge, Ryerson Estate, Bloomington, Passaic county. Built in 1800, and rebuilt in 1841; product, scrap blooms.

King Brothers, Drakesville, Morris county. Forge at Shippingsport. Built about 1865; product, scrap blooms.

Powerville Forge, B. F. Howell, Morristown. Works at Powerville. Built in 1845; abandoned.

Rockaway Forge, Rockaway, Morris county. Used direct process.

Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built about 1800; made blooms from scrap iron; abandoned.

Split Rock Forge, in Morris county. Built in 1797.

Warren Forge, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1875; partly dismantled.

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 floods 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 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.

North Kiln Forge, M. B. Seyfert & Co., Shartlesville, Berks county. Built in 1830.

Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862 ; Partly destroyed by a flood in 1889, and abandoned.

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 coun-

ty. 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, Shenandoah, 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.

Pine Forge, Mount Jackson, Shenandoah county. Rebuilt in 1874; abandoned.

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.

Little Doe Forge, on Little Doe creek, 13 miles west of Mountain City, Johnson county.

McQueen's Forge, Baker's Gap, Johnson county. Forge on Roane creek, 10 miles southeast of Mountain City. Built in 1877.

Morrison's Forge, on Laurel creek, 7 miles from Mountain City, Johnson county. Built in 1879.

Mud Splatter Forge, Johnson county. Built in 1867.

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 Mountain City. 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 Mountain City. 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 1873-74.

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 Elizabethton. Built in 1820.

Wagner's Forges, M. M. Wagner's Sons, Mountain City, Johnson county. Two forges on Little Doe creek, 7 and 9½ miles west of Mountain City.

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.

Roan Mountain Steel and Iron Company, Magnetic City, Mitchell county. Forge built in 1875; dismantled.

Rocky Point Forge, Murphy, Cherokee county. Rebuilt in 1870; abandoned.

Tomatola Forge, Tomatola Iron Company, Tomatola, Cherokee county. Built in 1869.

Tom's Creek Forge, on Tom's creek, Surry county. Built in 1862.

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.

Kimmswick Forge, Kimmswick, Jefferson county. Built in 1873; dismantled.

Maramec Iron Company, Maramec Iron Works, Phelps county. Built in 1829.

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. When not otherwise stated the converters are the ordinary tilting Bessemer converters. For a full description of these works see the list of rolling mills and steel works. The names of the mills which are equipped with machinery for making a specialty of rolling standard sections of steel rails are printed in SMALL CAPITALS.

MASSACHUSETTS—3.

American Steel Wheel Company, First and I sts., South Boston. General office, 143 Liberty st., New York. Boston office, 180 Summer st. One 3-ton converter.

Tremont Nail Company, West Wareham. One 3-ton Clapp-Griffiths converter.

WORCESTER STEEL WORKS, Worcester. Two 4-ton converters.

NEW YORK—1.

TROY STEEL AND IRON COMPANY, Troy. New York office, 26 Broadway. Two 10-ton converters.

PENNSYLVANIA—22 COMPLETED AND 2 BUILDING.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Two 7-ton converters.

BETHLEHEM (THE) IRON COMPANY, South Bethlehem. Four 7-ton converters.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. Two small converters. Idle.

CAMBRIA IRON AND STEEL WORKS, Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 11½-ton converters. Building two additional 11½-ton converters.

CARNEGIE BROTHERS & CO., LIMITED, 42-48 Fifth ave., Pittsburgh. Two works in Allegheny county: EDGAR THOMSON STEEL WORKS, at Bessemer, four 15-ton converters. DUQUESNE STEEL WORKS, at Cochran, two 7-ton converters.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester. Two 1½-ton Robert-Bessemer converters.

Columbia Iron and Steel Company, Uniontown. Two 5-ton converters.

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown. Two 3-ton Clapp-Griffiths converters.

- Hainsworth Steel Company, Pittsburgh. Two 6-ton converters.
- Homestead Steel Works, Carnegie, Phipps & Co., Limited, 42-48 Fifth ave., Pittsburgh. Works at Munhall. Two 5-ton converters.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 6-ton converters.
- LACKAWANNA IRON AND STEEL COMPANY, Scranton. Two works: NORTH SCRANTON WORKS, three 7-ton converters. SOUTH SCRANTON WORKS, two 9-ton converters.
- Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. Two 3-ton converters.
- NORTH BRANCH STEEL WORKS, North Branch Steel Company, Danville. Office, 330 Walnut st., Philadelphia. Two 4-ton converters.
- Oliver Iron and Steel Company, Pittsburgh. Two 2-ton Clapp-Griffiths converters.
- PENNSYLVANIA STEEL WORKS, Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Two 7-ton and three 8-ton converters.
- Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. One 10-ton converter.
- Pottstown Iron Company, Pottstown. Three 10-ton converters.
- Sharon Steel Casting Company, Sharon. Building one 4-ton converter.
- Shenango Valley Steel Company, New Castle. Building two 8-ton converters.
- Spang Steel and Iron Company, Pittsburgh. Office, 66-70 Sandusky st., Allegheny City. Works at Etna. Two 3-ton Clapp-Griffiths converters.
- Wellman Iron and Steel Company, Thurlow, Delaware county. Philadelphia office, 220 South Fourth st. Two 3-ton converters.

MARYLAND—1.

- MARYLAND STEEL COMPANY, 208 South Fourth st., Philadelphia. Works at Sparrow's Point, Baltimore county. Two 20-ton converters.

VIRGINIA—1.

- Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. Two 3-ton converters. Idle.

WEST VIRGINIA—2.

- Riverside Iron Works, Wheeling. Two 5-ton converters.
- Wheeling Steel Works, Wheeling. Works at Benwood. Two 5-ton converters.

KENTUCKY—1.

- Ashland Steel Company, Ashland. Two 5-ton converters.

TENNESSEE—2.

SOUTHERN IRON COMPANY, Nashville. Works at Chattanooga. One 5-ton converter. Experimented with basic process in 1891.
South Tredegar Iron Company, Chattanooga. One 2-ton converter. Idle.

OHIO—6.

Bellaire Nail Works, Bellaire. Two 5-ton converters.
CLEVELAND ROLLING MILL COMPANY, Cleveland. Two 10-ton converters.
Laughlin and Junction Steel Company, Mingo Junction. Branch office, Wheeling, W. Va. Two 5-ton converters.
Middleport Steel and Nail Works, The King, Gilbert, and Warner Company, Columbus. Works at Middleport. Two 4-ton converters.
Otis (The) Steel Company Limited, Cleveland. Two 5-ton converters.
Solid Steel Company, Alliance. One small experimental converter.

INDIANA—2.

Chicago Horse Shoe Company, Rookery Building, Chicago, Ill. Works at East Chicago, Ind. One 1½-ton Robert-Bessemer converter.
East Chicago Steel Works, Chicago Steel Manufacturing Company, Hammond. Two 3-ton converters. Idle.

ILLINOIS—10.

Belleville Steel Company, 415 Locust st., St. Louis. Two works at Belleville: One contains two 4-ton ordinary converters and the other two 3-ton Clapp-Griffiths converters. Clapp-Griffiths plant idle.
Centralia Iron and Nail Works, Centralia. One 2-ton converter. Idle.
Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Works at Stony Island ave. and Ninety-fifth st. One 2-ton Robert-Bessemer converter.
ILLINOIS STEEL COMPANY, Rookery Building, Chicago. Four separate works in Illinois: NORTH WORKS, at Chicago, two 6-ton converters. SOUTH WORKS, at South Chicago, three 10-ton converters. JOLIET WORKS, at Joliet, two 8-ton converters. UNION WORKS, at 3179 Ashland ave., Chicago, two 10-ton converters.
St. Louis Steel Foundry Company, 509 Olive st., St. Louis, Mo. Works at East St. Louis, Ill. One 4-ton basic Bessemer converter.
SPRINGFIELD IRON COMPANY'S IRON AND STEEL WORKS, The Springfield Iron Company, Springfield. Two 5-ton converters.

MICHIGAN—1.

Detroit Steel and Spring Works, Detroit Steel and Spring Company, Michigan and Hubbard aves., Detroit. Two 2-ton Robert-Bessemer converters.

WISCONSIN—1.

West Superior Iron and Steel Company, West Superior, Douglas county. Two 4-ton converters.

MISSOURI—1 COMPLETED AND 1 PARTLY BUILT.

St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Granite Building, St. Louis. Works at South St. Louis. Two 7-ton converters.

Union Steel and Iron Company, St. Joseph. Two 3-ton Robert-Bessemer converters partly built.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo. New York office, Mills Building. Two 5-ton converters.

UNITED STATES.

Total number of Bessemer steel works: 55 completed, 1 partly built, and 2 building. Of these 5 are Clapp-Griffiths plants with 9 converters, 4 are Robert-Bessemer plants with 6 converters, and 1 Robert-Bessemer plant with 2 converters is partly built. Total number of converters: 110 completed, 2 partly built, and 5 building.

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, structural shapes, bars, billets, forgings, etc.; a few works occasionally make a small quantity of rails.

NEW HAMPSHIRE—1.

✓ Nashua Iron and Steel Company, Nashua. One 10-ton furnace.

MASSACHUSETTS—2.

✓ Washburn and Moen Manufacturing Company, Worcester. One 12-ton and one 20-ton furnace.

Worcester Steel Works, Worcester. One 10-ton furnace. Negotiations pending for the reorganization of these works.

NEW YORK—4.

- ✓ Buffalo Steel Foundry, Pratt & Letchworth, Buffalo. One small furnace.
- ✓ Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. One 8-ton furnace. Product, steel castings.
- ✓ Ramel-Conley Iron and Steel Company, 290 Broadway, New York. Works at Brewster, Putnam county. One 10-ton furnace. Idle.
- ✓ Syracuse Steel Foundry Company, 351 West Fayette street, Syracuse. Works at Geddes. Two 10-ton furnaces.

NEW JERSEY—3.

Newark Steel Works, The Benjamin Atha and Illingworth Company, Newark. One 7-ton and one 15-ton furnace.
 Passaic Rolling Mill Company, Paterson. Two 20-ton furnaces.
 Trenton Steel Company, Trenton. One 7-ton furnace.

PENNSYLVANIA—EASTERN DISTRICT—10 COMPLETED AND 1 BUILDING.

- Bethlehem (The) Iron Company, South Bethlehem. Three completed furnaces (one 10-ton, one 20-ton, and one 35-ton) and one 35-ton furnace in course of construction and nearly completed.
- ✓ Eureka Cast Steel Company, Chester. Works at Lamokin. One 10-ton furnace. Product, steel castings.
- ✓ Lukens Iron and Steel Company, Coatesville. Philadelphia office, Bul-litt Building. Building two 15-ton furnaces.
- Midvale Steel Company, Nicetown, Philadelphia. Declines to give a description of its works for publication.
- ✓ Norristown Steel Company, Norristown. Two 15-ton furnaces. Product, ingots and castings.
- Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works opposite Manayunk. One 10-ton, one 20-ton, and one 25-ton furnace.
- Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville. Four 15-ton furnaces.
- Pottstown Iron Company, Pottstown, Montgomery county. One 12-ton furnace. Uses the basic process.
- Pottsville Iron and Steel Company, Pottsville. Two 20-ton furnaces.
- ✓ Standard Steel Casting Company, Thurlow, Delaware county. Two 10-ton, one 15-ton, and one 20-ton furnace. Product, steel castings.
- ✓ Wellman Iron and Steel Company, Thurlow, Delaware county. Philadelphia office, 220 South Fourth st. Two 15-ton furnaces.

PENNSYLVANIA—CENTRAL DISTRICT—2.

- ✓ North Branch Steel Company, Danville. Office, 330 Walnut st., Philadelphia. One 15-ton furnace.
- Pennsylvania Steel Company, Steelton. Office, 208 South Fourth st., Philadelphia. One 5-ton, two 15-ton, and two 30-ton furnaces.

PENNSYLVANIA—WESTERN DISTRICT—26 COMPLETED AND 1 BUILDING.

Aliquippa Steel Company, Westinghouse Building, Pittsburgh. Works at Aliquippa, Beaver county. Building one 15-ton furnace.

✓ Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Two 20-ton furnaces.

✓ Aschman (The) Steel Casting Company, Sharon. One 5-ton furnace. Product, steel castings.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Decline to give information concerning their works.

Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Three 20-ton furnaces, with the Pernot improvement, and one 15-ton Krupp washer.

✓ Carbon Iron Company, Thirty-second st., Pittsburgh. New York office, Mills Building. Two 15-ton and two 30-ton furnaces.

✓ Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Two 12-ton and two 20-ton furnaces. Product, steel castings. Use no miscellaneous steel scrap.

Homestead Steel Works, Carnegie, Phipps & Co., Limited, 42-48 Fifth ave., Pittsburgh. Works at Munhall. One 12-ton, six 20-ton, eight 25-ton, and one 35-ton furnace.

Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. One 20-ton and one 30-ton furnace.

✓ Johnson Company, Johnstown, Cambria county. One 2-ton and one 7-ton furnace. Product, ingots and castings.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 12-ton furnaces.

La Belle Steel Company, Pittsburgh. Two 15-ton furnaces.

✓ Latrobe Steel Works, Latrobe, Westmoreland county. Branch office, 251 South Fourth st., Philadelphia. Two 20-ton furnaces. Product used in making tires.

✓ Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg. Branch office, Iron Exchange Building, Pittsburgh. One 10-ton furnace.

Linden Steel Company, general office and works, Second avenue, Pittsburgh; down-town office, Lewis Building. Two 15-ton and one 25-ton furnace.

✓ McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport; branch office, 111 Water st., Pittsburgh. Two 20-ton furnaces.

Millvale Rolling Mill, Millvale Iron Company Limited, lessee, Millvale. P. O. address, Bennett. Two 15-ton furnaces.

✓ National Separating and Manufacturing Company, West Bridgewater. Office, 702 Duquesne Way, Pittsburgh. One small furnace. Product, steel castings.

✓ National Tube Works Company, McKeesport, Allegheny county. One 18-ton furnace.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at Chartiers. One 20-ton furnace.

✓ Sharon Steel Casting Company, Sharon. One 5-ton and one 15-ton furnace. Product, steel castings.

Singer, Nimick & Co. Limited, Pittsburgh. One 10-ton furnace.

✓ Soho Mills, Moorhead-McCleane Company, Pittsburgh. Two 15-ton furnaces.

Solar Iron and Steel Works, William Clark's Son & Co., Pittsburgh. Two 12-ton furnaces.

Spang Steel and Iron Company Limited, Pittsburgh. Office, 66-70 Sandusky st., Allegheny City. Works at Etna. Three 10-ton furnaces.

✓ Totten and Hogg Iron and Steel Foundry Company, Twenty-fourth st. and A. V. R. R., Pittsburgh. One 15-ton furnace. Product, steel castings.

West Penn Steel Works, Jennings Brothers & Co. Limited, Pittsburgh. Office and steel plant on Preble ave., Allegheny City. One 10-ton furnace.

KENTUCKY—1 COMPLETED AND 1 NEARLY COMPLETED.

✓ Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington. One 7-ton furnace.

✓ Watts (The) Steel and Iron Syndicate Limited, Middlesborough. Seven 25-ton furnaces, nearly completed; designed to use basic process.

TENNESSEE—1.

✓ Southern (The) Iron Company, Nashville. Works at Chattanooga. Two 10-ton furnaces, using basic process.

ALABAMA—2.

✓ Fort Payne Rolling Mill, Fort Payne. Two 15-ton furnaces; built to use basic process. Idle.

✓ Henderson Steel and Manufacturing Company, Birmingham. One 15-ton furnace; built to use basic process.

OHIO—10.

Burgess Steel and Iron Works, Portsmouth. Two works. One 8-ton, one 10-ton, and one 25-ton furnace.

Canton Steel Works, Bolton Iron and Steel Company, Canton. General office, Twenty-first and Liberty sts., Pittsburgh, Pa. Two 10-ton furnaces.

Cleveland Rolling Mill Company, Cleveland. Two 7-ton and two 15-ton furnaces.

✓ Kellogg (The) Seamless Tube and Manufacturing Company, Findlay, Eastern office, 40 Water st., Boston. One 10-ton and one 25-ton furnace.

✓ Otis (The) Steel Company Limited, Cleveland. Seven 15-ton furnaces.

- ✓ Solid Steel Company, Alliance, Stark county. One 3-ton and one 5-ton furnace. Product, steel castings.
- Whitely Steel Works, Springfield, Clarke county. One 8-ton furnace.
- Youngstown Steel Company, Youngstown. One 10-ton Pernot furnace for dephosphorizing metal by the Krupp-Bell process. Also one 20-ton Siemens furnace, now idle.
- Zanesville Iron Works, Ohio Iron Company, Zanesville, Muskingum county. One 10-ton furnace.

INDIANA—1 COMPLETED AND 2 BUILDING.

- ✓ Haugh-Kurtz Steel Company, Indianapolis. Works at Anderson, Madison county. Building one 10-ton furnace. Product to be ingots, billets, and castings.
- ✓ Midland (The) Steel Company, Muncie, Delaware county. Building one 24-ton furnace.
- ✓ Premier Steel Company, Indianapolis. Two 15-ton furnaces.

ILLINOIS—6.

- Atkinson Steel and Spring Works, Rookery Building, Chicago. Works at Harvey. Two 15-ton furnaces.
- Calumet Iron and Steel Company, Rookery Building, Chicago. Works at Cummings. Four 4-ton furnaces.
- Chicago Tire and Spring Company, Phoenix Building, Chicago. Works at Melrose, (Maywood P. O.,) Cook county. One 8-ton furnace. Product, ingots and castings.
- ✓ Norton Brothers, 44 River st., Chicago. Works at Maywood, Cook county. One open-hearth furnace.
- ✓ St. Louis Steel Foundry Company, 509 Olive st., St. Louis. Works at East St. Louis. One 6-ton furnace. Uses basic process.
- ✓ Springfield (The) Iron Company, Springfield. Two 20-ton Siemens-Pernot furnaces and one Pernot furnace for dephosphorizing pig metal.

MICHIGAN—1.

- ✓ Muskegon Iron and Steel Company, Muskegon. One 15-ton furnace completed and one 15-ton furnace building.

CALIFORNIA—1.

- Pacific Rolling Mill Company, 202 Market st., P. O. Box 2,032, San Francisco. One 5-ton and two 12-ton furnaces.

UNITED STATES.

Total number of open-hearth steel works in the United States: 71 completed, 1 nearly completed, and 4 building. Number of furnaces: 164 completed, 7 nearly completed, and 7 building.

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. 64 pots. Product used exclusively for car-wheel tires.

CONNECTICUT—3.

Collins Company, Collinsville, Hartford county. 60 pots. Product used by the company in its works in the manufacture of edge tools, steel plows, etc.

Farist (The) Steel Company, Bridgeport. 24 pots.

Windsor Locks Steel Company, Bridgeport. Works at Windsor Locks. 40 pots.

NEW YORK—4.

Chrome Steel Works, Kent ave. and Keap st., Brooklyn, Kings county. 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, Orange county. Operated by The National Saw Company, 96-98 Reade st., New York. 96 pots. Product used in making saws.

Sanderson Brothers Steel Company, Syracuse. 78 pots.

Syracuse Steel Foundry Company, Syracuse. Works burned January 7, 1892, and company will make only open-hearth castings hereafter.

NEW JERSEY—6.

Benjamin (The) Atha and Illingworth Company, Newark. Two works: Newark Steel Works, at Newark; 60 pots. New Jersey Steel Works, at Harrison, Hudson county; 30 pots.

Harvey Steel Company, Brills Station, Newark, Essex county. 8 pots. Heller & Brothers, Newark. 48 pots. Product used by the firm in making tools.

Pompton Steel and Iron Company, Pompton, Passaic county. Designed for 160 pots; only 24 pots used at a heat.

West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City, Hudson county. 96 pots.

PENNSYLVANIA—24 COMPLETED AND 1 BUILDING.

- Aliquippa Steel Company, Westinghouse Building, Pittsburgh. Works at Aliquippa, Beaver county. Building one 36-pot furnace.
- Beaver Falls Steel Works, Beaver Falls, Beaver county. 24 pots.
- Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh.
- Carpenter Steel Company, Reading, Berks county. New York office, Boreel Building. 96 pots.
- Crescent Steel Company, 136 First ave., Pittsburgh. Works, Forty-ninth to Fifty-first st. 180 pots.
- Cyclops Steel Works, Charles Burgess, Titusville. 36 pots.
- Emmens Metal Company, Youngwood. 4 pots. Product, castings. Adding an additional 4-pot furnace.
- Eureka Cast Steel Company, Chester. Works at Lamokin. 12 pots. Product, steel castings.
- Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. 24 pots.
- Frankford Steel Company, Frankford, Philadelphia. 40 pots.
- Greensburg Rolling Mill Company, Greensburg, Westmoreland county. 24 pots.
- Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. 204 pots.
- Hussey, Binns & Co. Limited, Pittsburgh. Works at Charleroi. 24 pots. Product used in making shovels and scoops.
- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. 102 pots. Product used in making saws, files, etc.
- La Belle Steel Company, Pittsburgh. 120 pots.
- Midvale Steel Company, Nicetown, Philadelphia.
- New Castle Steel Casting Company, New Castle. 22 pots. Product, steel castings.
- Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. 32 pots.
- Philadelphia Steel Works, Hallahan, Gross & Frank, South Second st. and Stone House Lane, Philadelphia. 10 pots.
- Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. 66 pots. Product, steel castings.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 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, Westinghouse Building, Pittsburgh. Works at Demmler. 48 pots.
- Wayne Iron and Steel Works, Brown & Co., (incorporated,) Pittsburgh. 162 pots.

MARYLAND—1.

Crown and Cumberland Steel Company, Cumberland. 24 pots. Idle.

TENNESSEE—1.

Southern (The) Steel Works, John Leighton & Sons, 610 Boyce st., Chattanooga. 16 pots.

OHIO—2.

Burgess Steel and Iron Works, Portsmouth. 24 pots.

Springfield (The) Steel Casting Company, Springfield. 12 pots. Product, steel castings.

INDIANA—2.

Oliver Chilled Plow Works, South Bend Iron Works, proprietors, South Bend. 96 pots. Entire product used by the works in the manufacture of plows.

Schulte, Lohoff & Co., Evansville. 30 pots. Product used by the firm in the manufacture of edge tools.

MICHIGAN—1.

Detroit Steel and Spring Company, Michigan and Hubbard avenues, Detroit. 30 pots.

UNITED STATES.

Total number of crucible steel works in the United States: 45 completed, and 1 building. Number of pots which can be used at each heat in completed works, 2,934.

PLATE AND SHEET MILLS.

NOTE.—Mills making only nail plate, tack plate, skelp, or shovel plate are not included in this list. 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, rolled for other firms.

Tremont Nail Company, West Wareham. Steel plates.

NEW YORK—4.

Elmira Rolling Mills, Elmira. N. D. Doxey & Co., lessees of plate mill. Iron plates.

Monhagen Steel Works, Middletown. Steel saw plates.

Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn. Black plates, or sheets, for tinning.

Troy Steel and Iron Company, Troy. Steel sheets.

NEW JERSEY—4.

American Sheet Iron Company, Phillipsburg. Iron and steel sheets.

Columbia Rolling Mill Company, Jersey City. Taggers iron.

Passaic Rolling Mill Company, Paterson. Iron and steel plates.

Paterson Iron Company, Paterson. Iron and steel plates.

PENNSYLVANIA—EASTERN DISTRICT—26.

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.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken. General office, 223 North Second st., Philadelphia. Iron and steel plates and sheets.

Easton Sheet Iron Works, Theodore Oliver, Easton. Iron sheets.

Gibraltar Iron Works, Simon Seyfert, Reading. Iron plates.

Glasgow Iron Company, Pottstown. Iron and 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, Coatesville. Iron plates and sheets. Idle.
- Lukens Iron and Steel Company, Coatesville, Chester county. Iron and steel plates.
- McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Iron and steel plates.
- Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Steel sheets.
- Parkesburg Iron Company, Parkesburg. Iron and steel plates.
- Penn Treaty Iron Works, Marshall Brothers & Co., Beach and Marlborough sts., Philadelphia. Iron and steel plates and sheets.
- Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Iron and steel plates.
- Plymouth Rolling Mill, J. Wood and Brothers Company, lessee, Conshohocken. General office, 223 North Second st., Philadelphia. Iron and steel plates and sheets.
- Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown. Iron plates and sheets.
- 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 & Brother, Reading. Iron plates.
- Thorndale Iron Works Company, Thorndale, Chester county. Iron plates.
- Valley Iron Works, W. W. Kurtz & Sons, Coatesville. Iron and steel plates.
- Viaduct Iron Works, Coatesville Rolling Mill Company, Coatesville. Iron and steel sheets.
- Wellman Iron and Steel Company, Thurlow, Delaware county. Philadelphia office, 220 South Fourth st. Iron and steel plates.

PENNSYLVANIA—CENTRAL DISTRICT—7.

- Central Iron and Steel Works, Harrisburg. Iron and steel plates.
- East Lebanon Iron Company, Lebanon. 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 and steel plates.
- Pennsylvania Steel Company, 208 South Fourth st., Philadelphia. Works at Steelton, Dauphin county. Steel plates.
- York Rolling Mill, Steacy and Denney Company, (incorporated,) York. Iron plates.

PENNSYLVANIA—WESTERN DISTRICT—37 COMPLETED AND 2 BUILDING.

- Aliquippa Steel Company, Westinghouse Building, Pittsburgh. Works at Aliquippa. Building; to roll steel plates and sheets.
- 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 for tinning and other purposes.
- Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Iron and steel sheets for tinning and other purposes.
- 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.
- Blairsville Rolling Mill and Tin Plate Company, Blairsville. Building; to roll black plates, or sheets, for tinning.
- Canonsburg Iron and Steel Company, Canonsburg, Washington county. Iron and steel sheets for stamping and tinning.
- Carbon Iron Company, Thirty-second st., Pittsburgh. Steel plates.
- Carnegie, Phipps & Co., Limited, 42-48 Fifth ave., Pittsburgh. Three mills. Iron and steel armor and other plates.
- Chartiers Iron and Steel Company Limited, Iron Exchange, Pittsburgh. Works at Putnam P. O. Iron and steel sheets.
- Clinton Rolling Mill, Clinton Iron and Steel Company, 208 Wood st., 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's Sons Company, (incorporated,) Pittsburgh. Iron plates and sheets.
- Kimberly (P. L.) & Co., Atlantic Iron and Nail Works, 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, Second avenue, Pittsburgh. Down-town office, Lewis Building. Steel armor and other plates and sheets.
- McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport. Branch office, 111 Water st., Pittsburgh. Iron and steel sheets.

- Millvale Rolling Mill, Millvale Iron Company Limited, lessee, Millvale. P. O. address, Bennett. Iron and steel plates.
- National Tube Works Company, McKeesport, Allegheny county. Iron boiler plates.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at Chartiers. Steel plates and sheets.
- Republic Iron Works, Twenty-fifth st., South Side, Pittsburgh. Iron and steel plates and sheets.
- Scottdale Iron and Steel Company Limited, Scottdale, Westmoreland county. Iron and steel sheets.
- Sharon Iron Company Limited, Sharon, Mercer county. Iron and steel plates and sheets.
- Singer, Nimick & Co. Limited, Pittsburgh. Steel plates.
- Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Iron plates and sheets.
- Soho Mills, Moorhead-McCleave Company, Pittsburgh. Iron and steel plates and sheets.
- Spang Steel and Iron Company, Pittsburgh. Office, 66-70 Sandusky st., Allegheny City. Works at Etna. Steel plates.
- United States Iron and Tin Plate Manufacturing Company, Demmler P. O., Allegheny county. Iron and steel plates and sheets.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Office, 64-68 Anderson st., Allegheny City. Works at Sharpsburg. Iron plates.
- Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Iron boiler plates.
- West Penn Steel Works, Jennings Brothers & Co. Limited. Office, Preble ave., Allegheny City. Rolling mill at Leechburg, Armstrong county. Steel sheets and light plates.
- Wheatland Iron Company, Wheatland, Mercer county. Pittsburgh office, 208 Wood st. Iron plates.

DELAWARE—6.

- Edge Moor Iron Company, Edge Moor, New Castle county. Plate mill not in operation.
- Marshallton Iron Works, (incorporated,) Marshallton, New Castle county. Iron sheets.
- Minquas Iron Works, McCullough Iron Company, 1600 Washington ave., Philadelphia, Pa. Works at Wilmington. Iron sheets.
- Newport Rolling Mills, Marshall Iron Company, Newport. Iron and steel sheets.
- Riverside Iron Company, lessee, New Castle. Philadelphia office, 524 Walnut st. Iron plates.
- Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Iron boiler and other plates.

MARYLAND—3.

Locust Point Iron and Steel Works, Coates & Co., Locust Point, Baltimore. Iron and steel plates and sheets.

McCullough Iron Company, 1600 Washington ave., Philadelphia, Pa. Works at Northeast and Rowlandville, Cecil county. Iron sheets.

VIRGINIA—1 BUILDING.

Roanoke Iron Company, Roanoke. Building; to roll plate iron.

WEST VIRGINIA—2.

Crescent Iron Works, Whitaker Iron Company, Wheeling. Iron sheets. Top Mill, Wheeling Iron and Nail Company, Wheeling. Iron and steel sheets.

KENTUCKY—5.

Anchor Iron and Steel Works, 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. Works 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 Rolling Mill Company, Newport. Iron and steel 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—23.

Ætna Iron and Steel Company, Bridgeport. Iron and steel plates and sheets.

Britton Iron and Steel Company, Cleveland. Iron and steel plates and sheets.

Britton (The) Rolling Mill Company, 64 Hoyt ave., Cleveland. Iron and steel plates and heavy sheets.

Burgess Steel and Iron Works, Portsmouth. Two works. Iron and steel plates and sheets.

Cambridge (The) Iron and Steel Company, Cambridge. Iron and steel sheets.

Cincinnati Rolling Mill Company, 298 East Pearl st., Cincinnati. Works at Riverside. Iron and steel sheets and black plates for tinning.

Cleveland Rolling Mill Company, Cleveland. Iron and steel plates and sheets.

Falcon Iron and Nail Company, Niles, Trumbull county. Two works. Iron and steel sheets.

Haselton Iron Works, The Andrews Brothers Company, Youngstown. Iron and steel plates and sheets.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale. Iron and steel sheets for tinning and other purposes.

Ironton Rolling Mill, The Eagle Iron and Steel Company, Ironton. Iron and steel sheets.

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. Iron plates and sheets.

Mahoning Valley Works, The Mahoning Valley Iron Company, Youngstown. Iron plates and sheets.

Maumee Rolling Mill Company, Toledo. Iron and steel plates and sheets.

New Philadelphia Iron and Steel Company, New Philadelphia. Iron plates and sheets.

Otis (The) Steel Company Limited, Cleveland. Steel plates.

Piqua (The) Rolling Mill Company, Piqua. Iron and steel sheets.

Reeves Iron Company, Canal Dover. Iron and steel sheets.

Russia Mill, Joshua S. Ingalls & Co., Troy. "Craig" polished sheet steel. Made from purchased sheets.

Standard (The) Iron Company, Bridgeport. Iron and steel plates and sheets.

Summers Iron Works, Summers Brothers & Co., Struthers. Iron sheets.

Wellsville Plate and Sheet Iron Company, Wellsville. Iron and steel plates and sheets.

INDIANA—2 COMPLETED AND 2 BUILDING.

American (The) Tin Plate Company, Elwood. Building; to roll black plates, or sheets, for tinning.

Irondale (The) Steel and Iron Company, Anderson. Iron sheets.

Midland (The) Steel Company, Muncie. Building; to roll steel plates and sheets.

New Albany Rail Mill Company, New Albany. Iron and steel sheets.

ILLINOIS—1 COMPLETED AND 3 BUILDING.

Joliet Sheet Rolling Mill Company, Joliet. Building; to roll steel sheets.

Lewistown Works, Pioneer Tinplate Company, Joliet. Building; to roll black plates, or sheets, for tinning.

Norton Brothers, 44 River st., Chicago. Works at Maywood. Experimenting with fluid metal rolling machinery for the manufacture of steel sheets for tinning.

Springfield (The) Iron Company, Springfield. Steel plates and sheets.

MICHIGAN—1.

Eureka Iron and Steel Works, Detroit. Iron plates.

WISCONSIN—1.

West Superior Iron and Steel Company, West Superior. Steel plates.

MISSOURI—2.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Iron and steel sheets.

Union Steel and Iron Company, St. Joseph. Iron and steel sheets.
Not in operation.

UNITED STATES.

Total number of iron and steel plate and sheet mills in the United States: 129 completed, and 8 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—2.

Cumberland Nail and Iron Company, Bridgeton. Branch office, 43 North Water st., Philadelphia. 90 nail machines.

Oxford Iron and Nail Company, Oxford. New York office, 52 Wall st. 103 nail machines.

PENNSYLVANIA—EASTERN DISTRICT—4.

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.

Plymouth Rolling Mill, J. Wood and Brothers Company, lessee, Conshohocken. 12 nail machines. Nail department idle.

Pottstown Iron Company, Pottstown. 95 nail machines.

PENNSYLVANIA—CENTRAL DISTRICT—16.

- Bellefonte Iron and Nail Company, Bellefonte. 53 nail machines.
- Bradford County Nail Works, Wm. H. Godcharles, Towanda, Bradford county. 40 nail machines.
- Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) Harrisburg. 103 nail machines.
- Danville Nail Works, Danville. 92 nail machines. Idle.
- Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 50 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, Hollidaysburg and Gap Iron Works, Hollidaysburg. 30 nail machines. Idle.
- Lewisburg Rolling Mill, Lewisburg Iron and Steel Company, Lewisburg. 41 nail machines. Nail department idle.
- Lock Haven Nail Works, Charles M. O'Connor, Lock Haven. 20 nail machines. Idle.
- Milton Nail Works, The C. A. Godcharles Company, Milton. 88 nail machines.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 53 nail machines.
- Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury. 41 nail machines. Idle.
- Taggarts & Howell, Northumberland. 95 nail machines.
- Watsontown Nail Works, Watsontown. 25 nail machines.
- Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. 70 nail machines.

PENNSYLVANIA—WESTERN DISTRICT—5.

- 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.
- Etna Iron Works Limited, New Castle, Lawrence county. 55 nail machines. Nail department idle, and not likely to be operated again.
- Sharon Iron Company Limited, Sharon. 64 nail machines.

VIRGINIA—1.

- Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. 146 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. 177 nail machines.
Riverside Iron Works, Wheeling. 224 nail machines. Nail factory idle.
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. Idle.

ALABAMA—2.

Alabama Iron and Steel Company, Brierfield. 72 nail machines.
Fort Payne Rolling Mill, Fort Payne. 5 nail machines. Idle.

OHIO—12.

Belfont Iron Works Company, Ironton. 126 nail machines.
Bellaire Nail Works, Bellaire. 125 nail machines.
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. 142 nail machines.
Kelly (The) Nail and Iron Company, Ironton. 119 nail machines.
Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry.
225 nail machines.
Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver,
Youngstown. 50 nail machines.
Mahoning Valley Works, The Mahoning Valley Iron Company, Youngs-
town. 55 nail machines.
Middleport Steel and Nail Works, The King, Gilbert, and Warner Com-
pany, Columbus. Works at Middleport. 102 nail machines.
Wellston Steel and Nail Mill, E. J. Bird, Jr., Ironton. Works at Well-
ston. 65 nail machines. Idle.
Whitely Steel Works, Springfield. 2 nail machines. Idle.

INDIANA—4.

Greenfield Iron and Nail Company, Greenfield. 50 nail machines.
Lakeside (The) Nail Company, 647 Rookery Building, Chicago. Works
at Hammond. 202 nail machines.
Muncie Nail Company, Muncie. 50 nail machines.
Terre Haute Iron and Steel Company, Terre Haute. 64 machines. Idle.

ILLINOIS—4.

Belleville Steel and Iron Nail Works, Belleville. 60 nail machines. Idle.
 Belleville Steel Company, Belleville. 154 nail machines.
 Calumet Iron and Steel Company, Rookery Building, Chicago. Works
 at Cummings. 132 nail machines. Idle.
 Centralia Iron and Nail Works, Centralia. 52 nail machines. Idle.

MISSOURI—1.

Union Steel and Iron Company, St. Joseph. 50 nail machines. Not in
 operation.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo. 27 nail machines. Idle.

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: 65.
 Number of nail machines: 5,546.

WIRE-NAIL WORKS.

NOTE.—Some of the wire-nail works purchase the wire which they use, but several establishments have rod mills and roll rods and draw wire for their own use and for sale. The works which roll rods are fully described in the list of rolling mills. The capacities are printed as they are given by the respective manufacturers.

MASSACHUSETTS—11.

Atlas Tack Corporation, 508 Sears Building, Boston. Sizes, from $\frac{1}{8}$ to 6 inches. Controls the following works:

A. Field & Son, (or Albert Field Tack Company,) Taunton.

American Tack Company, Fairhaven. Number of nail machines, 18.

Dunbar, Hobart & Co., South Abington. Number of nail machines, 31.

Taunton Tack Company. Taunton.

Baker (Charles F.) & Co., 50 Lincoln st., Boston. Sizes, 15, 16, and 17 gauges. Number of nail machines, 32.

Cushing, (Frank,) Palmer. Sizes, 10-penny and smaller. Number of nail machines, 22.

Gurney, (D. B.,) Whitman. Draws wire and makes wire nails. Sizes, up to 20-penny. Number of nail machines, 17. Annual capacity, 15,000 kegs.

Perkins Brothers, Bridgewater. Draw wire and make wire nails. Sizes, from 9 inches long down. Number of nail machines, 38. Annual capacity, 25,000 kegs.

Taunton Wire Nail Company, Taunton. Special nails. Number of nail machines, 16.

West Dennis Wire Nail Company, West Dennis. Idle.

Wire (The) Goods Company, Worcester. Makes all sizes of iron, brass, and copper nails.

RHODE ISLAND—1.

American Screw Company, Providence. Draws wire and makes all sizes of wire nails. Number of nail machines, 51.

CONNECTICUT—3.

Birmingham Wire Nail Company, Birmingham. R. S. Gardner, Receiver. Idle.

New Haven (The) Wire Manufacturing Company, New Haven. Draws wire and makes all sizes of wire nails. Number of nail machines, 8. Annual capacity, 7,000 kegs.

Russell and Erwin Manufacturing Company, New Britain. Office, 45 Chambers st., New York City.

NEW YORK—5.

Binghamton Wire Goods Company, Binghamton. Draws wire and makes nails to order. Number of nail machines, 4.

Brooklyn Wire Nail Company, 126 Freeman st., Brooklyn. A. R. Whitney & Co., agents, 29 Broadway, New York. Draws wire and makes wire nails up to 60-penny, (6 inches.) Number of nail machines, 65. Annual capacity, 130,000 kegs.

Griswold Brothers, Troy. Draw wire and make all sizes of wire nails up to 8-inch spikes. Number of nail machines, 19. Annual capacity, 20,000 kegs.

Hassall, (John,) 63 Elizabeth st., New York City. Works at Clay and Oakland sts., Brooklyn. Sizes, from the smallest up to 4 inches. Specialty, escutcheon pins, made of brass, copper, and steel. Number of nail machines, 50. Annual capacity, 5,000 kegs.

Kilmer Manufacturing Company, Newburgh. Rolls rods, draws wire, and makes wire nails of all sizes up to 40-penny. Number of nail machines, 25. Daily capacity, 100 kegs.

NEW JERSEY—1.

John A. Roeblings' Sons Company, Trenton. All sizes of wire nails. Number of nail machines, 21. Annual capacity, 12,000 kegs.

PENNSYLVANIA—8 AND 1 BUILDING.

Beaver Falls Mills, Carnegie, Phipps & Co., Limited, Beaver Falls. Branch office and post-office address, 42-48 Fifth ave., Pittsburgh. Roll rods, draw wire, and make wire nails. Number of nail machines, 118. Annual capacity, 800,000 kegs.

Braddock Wire Company, Pittsburgh. Rolls rods, draws wire, and makes wire nails. Annual capacity, 500,000 kegs.

New Castle Wire Nail Company, New Castle. Rolls rods, draws wire, and makes wire nails. Number of nail machines, 140. Annual capacity, 600,000 kegs.

Oliver and Roberts Wire Company, Pittsburgh. Draws wire and makes all sizes of wire nails. Number of nail machines, 132. Annual capacity, 600,000 kegs.

Philips, Townsend & Co., North Penn Junction, Philadelphia. Draw wire and make all kinds of wire nails. Number of nail machines, 96. Annual capacity, 200,000 kegs.

Pickering, (R. S.) lessee, Norristown. Sizes, from $\frac{1}{4}$ to $2\frac{1}{2}$ inches. Number of nail machines, 16. Annual capacity, 6,000 kegs.

Scranton (The) Wire and Nail Factory, James Nolan, Manager, Scranton. Draws wire and makes wire nails. Sizes, at present, 20-penny and all smaller sizes. Number of nail machines, 20. Enlarging works. When new works are completed will have a capacity of 60,000 kegs.

Taylor (The) Wire Nail Company, New Stanton. Building a wire-nail plant. Will have 50 machines in operation in 1892, and will probably enlarge the plant.

Tresise Wire Nail Factory, Sharon. Number of nail machines, 4. Idle.

VIRGINIA—1.

Maryland Tack Company, Front Royal. Number of nail machines, 12. Not now operating nail machines.

OHIO—7.

Baackes Wire Nail Company, Cleveland. Draws wire and makes wire nails. Number of nail machines, 100. Annual capacity, 600,000 kegs.

Cincinnati Barb Wire Fence Company, Cincinnati. Draws wire and makes wire nails. Number of nail machines, 30.

Frank's Wire Nail Company, 35 West Mound st., Columbus. Idle, and machinery for sale.

H. P. Nail Company, Cleveland. Rolls rods, draws wire, and makes wire nails. Number of machines, 300. Annual capacity, 1,000,000 kegs.

- New (The) Philadelphia Wire and Nail Company, New Philadelphia. Draws wire and makes all sizes of wire nails. Number of nail machines, 50. Annual capacity, 100,000 kegs.
- Salem Wire Nail Company, Salem. Works at Salem and at Findlay. Salem Works, 95 nail machines; annual capacity, 400,000 kegs. Findlay Works, 96 nail machines; annual capacity, 400,000 kegs.
- United States (The) Steel Company, Jackson, Jackson county. Draws wire and makes all sizes of wire nails. Number of nail machines, 60. Annual capacity, 300,000 kegs.

INDIANA—3.

- American (The) Wire Nail Company, Anderson. Rolls rods, draws wire, and makes all sizes of wire nails. Number of nail machines, 100. Annual capacity, 300,000 kegs.
- Hazen (The) Company, Cincinnati, Ohio. Works at Anderson. Sizes, from $\frac{3}{16}$ to 12 inches. Number of nail machines, 75. Annual capacity, 200,000 kegs.
- Indiana (The) Wire Fence Company, Crawfordsville, Montgomery county. Annual capacity, 10,000 kegs.

ILLINOIS—3.

- Ashley Wire Company, Joliet, Will county. Draws wire and makes wire nails. Sizes, from 3-penny to 10-penny. Number of nail machines, 5.
- Illinois (The) Wire Nail Company, No. 3 Dix st., Chicago.
- Lambert and Bishop Wire Fence Company, Joliet. Draws wire and makes standard sizes of wire nails only. Number of nail machines, 100. Annual capacity, 500,000 kegs.

MICHIGAN—1.

- Western Nail Company Limited, Battle Creek, Calhoun county. Sizes, from smallest up to 60-penny. Number of nail machines, 14. Daily capacity, single turn, 200 kegs.

MISSOURI—1.

- St. Louis Wire Mill Company, St. Louis. Draws wire and makes all sizes of wire nails. Number of nail machines, 82. Annual capacity, 300,000 kegs.

IOWA—1.

- McCosh Iron and Steel Company, Burlington. Draws wire and makes all sizes of wire nails. Number of nail machines, 46.

NEBRASKA—1.

- Omaha Barbed Fence and Nail Company, Omaha. Number of nail machines, 8.

WASHINGTON—1 BUILDING.

Puget Sound Wire Nail and Steel Company, Everett, Snohomish county. A. R. Whitney, Jr., General Manager. Building a mill to draw wire and make all sizes of wire nails up to spikes 12 inches long. Number of nail machines, 56. Annual capacity, 250,000 kegs. Will begin operations about May 1, 1892.

CALIFORNIA—2.

California Wire Works, 9 Fremont st., San Francisco. Draws wire and makes wire nails from 2-penny to 12-inch spikes. Number of nail machines, 32. Annual capacity, 120,000 kegs.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Works at Oakland. Draws wire and makes wire nails. Number of nail machines, 22.

UNITED STATES.

Total number of wire-nail works in the United States: 49 completed, and 2 building.

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. The ton used in giving capacities is the net ton of 2,000 pounds.

NEW HAMPSHIRE—1.

Haley Manufacturing Company, Concord. Annual capacity, 600 tons of wire.

MASSACHUSETTS—10.

Gurney, (D. B.) Whitman. Annual capacity, 750 tons of wire.

Lamb (Horace) & Co., Northampton. Annual capacity, 300 tons of wire.

Palmer Wire Manufacturing Company, Palmer. Annual capacity, 2,500 tons of wire.

Perkins Brothers, Bridgewater. Annual capacity, 1,500 tons of wire.

Prentiss (G. W.) & Co., Holyoke.

Prouty Wire Company, Charlton City.

Spencer Wire Company, Spencer. Annual capacity, 1,500 tons of wire.

Washburn and Moen Manufacturing Company, Worcester. Two works.

Rods and wire; annual capacity, 100,000 tons. *See Illinois.*

Worcester Wire Company, Worcester. Annual capacity, 15,000 tons of wire.

RHODE ISLAND—1.

American Screw Company, Providence.

CONNECTICUT—4.

Ansonia (The) Brass and Copper Company, Ansonia. Office address, P. O. Box 2375, New York City. Draws iron and steel wire but principally brass and copper wire.

Gilbert and Bennett Manufacturing Company, Georgetown. Annual capacity, 2,000 tons of wire.

New Haven Rolling Mill Company, New Haven. Rods. Annual capacity, 5,000 tons.

New Haven Wire Manufacturing Company, New Haven. Annual capacity, 12,000 tons of wire.

NEW YORK—7.

Binghamton Wire Goods Company, Binghamton. Annual capacity, 125 tons of wire.

Brooklyn Wire Nail Company, 126 Freeman st., Brooklyn. A. R. Whitney & Co., agents, 29 Broadway, New York.

Griswold Brothers, Troy. Annual capacity, 3,500 tons of wire.

Kilmer Manufacturing Company, Newburgh. Rods and wire. Rods consumed by the company in the manufacture of barb wire and fence wire of all kinds. Daily capacity, 50 tons of wire.

Troy Steel and Iron Company, Troy. Rods.

Wickwire Brothers, Cortland. Annual capacity, 400 tons of wire.

Wolff (R. H.) & Co. Limited, 117th and 118th sts. and Harlem river, New York City.

NEW JERSEY—2.

John A. Roebling's Sons Company, Trenton. Rods and wire. Annual capacity, 20,000 tons of rods and 35,000 tons of wire.

Trenton Iron Company, Trenton. Rods and wire.

PENNSYLVANIA—14.

Beaver Fall Mills, Carnegie, Phipps & Co., Limited, Beaver Falls. Branch offices and post-office address, 42-48 Fifth ave., Pittsburgh. Rods and wire. Annual capacity, 54,000 tons of rods.

Braddock Wire Company, Pittsburgh. Rods and wire. Annual capacity, 40,000 tons of rods.

Cambria Iron Company, Johnstown. Philadelphia office, 218 South Fourth st. Rods. Annual capacity, 30,000 tons. Building a wire-drawing plant.

Hazard (The) Manufacturing Company, Wilkesbarre. Draws wire for its own use in the manufacture of wire rope.

Iowa Barb Wire Company, Allentown. Rods and wire. Annual capacity, 35,000 tons of rods and 20,000 tons of wire.

Kidd Steel Wire Company Limited, Sharpsburg. Polished drill rods and needle wire.

Lehigh and Franklin Wire Mills, Stewart & Co., Easton.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Rods and wire. Annual capacity, 1,500 tons of rods.

New Castle Wire Nail Company, New Castle. Rods and wire. Annual capacity, 50,000 net tons of rods and 50,000 tons of wire.

Oliver and Roberts Wire Company, Pittsburgh. Rods and wire. Annual capacity, 50,000 tons of rods and 60,000 tons of wire.

Philadelphia Wire Works, Thomas Hamilton's Sons, 1340-52 Vienna st., Philadelphia. Annual capacity, 1,500 tons of wire.

Philips, Townsend & Co., North Penn Junction, Philadelphia. Annual capacity, 10,000 tons of wire, all consumed in nail works.

Pittsburgh Wire Company, Braddock. Branch office, 33-43 Seventh ave., Pittsburgh. Rods and wire. Annual capacity, 25,000 tons of rods. To go into operation early in 1892.

Scranton (The) Wire and Nail Factory, James Nolan, Manager, Scranton. Draws wire. Building new works, which, when completed, will have an annual capacity of 6,000 tons of wire.

OHIO—7.

American Wire Company, Cleveland. Rods and wire. Annual capacity, 75,000 tons of rods and 50,000 tons of wire.

Baackes Wire Nail Company, Cleveland. Annual capacity, 40,000 tons of wire. Building a rod mill.

Cincinnati Barb Wire Fence Company, Cincinnati. Draws wire.

Cleveland Rolling Mill Company, Cleveland. Rods and wire. Annual capacity, 125,000 tons of rods and 50,000 tons of wire.

H. P. Nail Company, Cleveland. Rods and wire. Annual capacity, 48,000 tons of rods or wire, used by the company in making nails.

New (The) Philadelphia Wire and Nail Company, New Philadelphia. Annual capacity, 8,000 tons of wire.

United States (The) Steel Company, Jackson. Draws wire. Contemplates erecting a rod mill in 1892.

INDIANA—1.

American (The) Wire Nail Company, Anderson. Rods and wire. Annual capacity, 45,000 tons of rods and 30,000 tons of wire.

ILLINOIS—7.

Ashley Wire Company, Joliet. Annual capacity, 100 tons of wire.

Baker Wire Company, Chicago. Works at Lockport. Annual capacity, 20,000 tons of wire.

Chicago Wire and Spring Company, corner Lake and La Salle sts., Chicago. Works at Chicago and Lockport.

Illinois Steel Company, Rookery Building, Chicago. Rod mill at Joliet Works. Annual capacity, 60,000 tons. Wire-drawing plant at Union Works idle.

Lambert and Bishop Wire Fence Company, Joliet. Annual capacity, 75,000 tons of wire.

Superior Barbed Wire Company, De Kalb. Manufactures barb wire only. Intends to erect a wire-drawing plant in the spring of 1892.

Waukegan Works, Washburn and Moen Manufacturing Company, Waukegan. Main office, Worcester, Mass.; Chicago office, 107-109 Lake st. Wire rods and wire. Annual capacity, 100,000 tons. *See Massachusetts.*

MISSOURI—1.

St. Louis Wire Mill Company, St. Louis. Annual capacity, 32,000 tons of wire.

IOWA—1.

McCosh Iron and Steel Company, Burlington.

WASHINGTON—1 BUILDING.

Puget Sound Wire Nail and Steel Company, Everett, Snohomish county. A. R. Whitney, Jr., General Manager. Building a wire-drawing plant to have an annual capacity of 12,500 tons of wire. Will begin operations about May 1, 1892.

CALIFORNIA—2.

California Wire Works, 9 Fremont st., San Francisco. Annual capacity, 10,000 tons of wire.

Pacific Iron and Nail Company, 9 Beale st., San Francisco.

UNITED STATES.

Number of works in the United States having wire-rod rolling machinery: 21 completed, and 1 building.

Number of works having wire-drawing plants: 53 completed, and 2 building.

LOCOMOTIVE WORKS.

NOTE.—The following list does not include railroad companies which build locomotives. Unless otherwise stated these works build freight and passenger locomotives.

MAINE—1.

Portland Locomotive Works, Portland. Annual capacity, 72.

NEW HAMPSHIRE—1.

Manchester Locomotive Works, Manchester. All kinds. Annual capacity, 125.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence. Annual capacity, 200.

NEW YORK—4.

Brooks Locomotive Works, Dunkirk. All kinds. Annual capacity, 240.

Hunt (C. W.) Company, 45 Broadway, New York. Works at West New Brighton. Locomotives for industrial railways and mines.

New York Locomotive Works, Rome. Annual capacity, 150.

Schenectady Locomotive Works, Schenectady. Annual capacity, 425.

NEW JERSEY—2.

Cooke Locomotive and Machine Company, Paterson. All kinds. Annual capacity, 180.

Rogers (The) Locomotive and Machine Works, Paterson. All kinds. Annual capacity, 300.

PENNSYLVANIA—6.

Allison, (L. S.) Hazleton and Minersville. Mine locomotives. Annual capacity, 24.

Baldwin Locomotive Works, Burnham, Williams & Co., Philadelphia. All kinds. Annual capacity, 1,000.

Dickson Manufacturing Company, Scranton. Standard and special locomotives. Annual capacity, 100.

Pittsburgh Locomotive and Car Works, Pittsburgh. All kinds. Annual capacity, 130.

Porter (H. K.) & Co., Pittsburgh. Light locomotives, street motors, and compressed air locomotives. Annual capacity, 150.

Vulcan Iron Works, Wilkesbarre. Light and mine locomotives. Annual capacity, 40.

MARYLAND—1.

Ryan-McDonald Manufacturing Company, Baltimore. Works at Curtis Bay. Light locomotives. Annual capacity, 50.

VIRGINIA—3.

Richmond Locomotive and Machine Works, Richmond. Annual capacity, 200.

Roanoke Machine Works, Roanoke. Annual capacity, 50 consolidation freight locomotives.

Virginia Iron Works, T. W. Godwin & Co., Norfolk. Narrow-gauge locomotives. Annual capacity, 50.

OHIO—1.

Lima Machine Works, Lima. Shay patent and ordinary direct locomotives. Annual capacity, 75.

ILLINOIS—1.

Grant Locomotive Works, First National Bank Building, Chicago. All kinds. Annual capacity, 200.

UNITED STATES.

Total number of locomotive works in the United States: 21. Total annual capacity, 3,761.

WROUGHT-IRON PIPE WORKS.

NEW YORK—2.

Cohoes Tube Works, Curtis & Co., Cohoes. Sizes, from $\frac{1}{2}$ to 2 inches. Annual capacity, 12,000 tons.

Syracuse Tube Company, Syracuse. Sizes, from $1\frac{1}{4}$ to 8 inches. Annual capacity, 25,000 tons.

NEW JERSEY—2.

Cumberland Nail and Iron Company, Bridgeton. Branch office, 43 North Water st., Philadelphia. Sizes, $\frac{1}{2}$ to $1\frac{1}{2}$ inches.

Spiral (The) Weld Tube Company, 43 John st., New York. Works at East Orange. Sizes, from 6 to 24 inches. Daily capacity, 6,000 feet.

PENNSYLVANIA—18.

Allison (The) Manufacturing Company, Junction Car Works and Flue Mill, Thirty-second and Walnut sts., Philadelphia.

American Tube and Iron Company, Middletown. Office, 98 John st., New York. Sizes, from $\frac{1}{4}$ to 16 inches outside diameter. Daily capacity, 215 tons. *See Ohio.*

Byers (A. M.) & Co., Pittsburgh. All sizes.

- Chester (The) Pipe and Tube Company, Chester. Office, 267 South Fourth st., Philadelphia. Sizes, from 1½ to 10 inches. Annual capacity, 25,000 tons.
- Conshohocken Tube Company, Conshohocken. Sizes, from ½ to 4 inches. Annual capacity, 10,000 tons.
- Continental Tube Works, Oil Well Supply Company, Pittsburgh. Sizes, from ½ to 16 inches. Daily capacity, 225 tons.
- Duquesne Tube Works Company, Ferguson Building, Pittsburgh. Works at Duquesne. Sizes, from ½ to 10 inches. Annual capacity, 30,000 tons.
- Etna Iron and Tube Works, Spang, Chalfant & Co., Pittsburgh. Works at Etna. Annual capacity, 30,000 tons.
- Lehigh Tube and Coil Works, Albright's Son & Co., Allentown. Sizes, from ½ to 2 inches.
- National Tube Works Company, McKeesport. Offices, Boston, New York, Pittsburgh, Chicago, and St. Louis. Sizes, from ½ to 24 inches. Annual capacity, 250,000 tons.
- Norristown Iron Works, James Hooven, Norristown. Sizes, from ½ to 2½ inches, butt welded. Annual capacity, double turn, 5,600 tons.
- Oil City Tube Company, Oil City. Sizes, from 1½ to 12 inches. Annual capacity, 35,000 tons.
- Pascal Iron Works, Morris, Tasker & Co., (incorporated,) 222 South Third st., Philadelphia. Sizes, from ½ to 16 inches. *See Delaware.*
- Pennsylvania Tube Works, Pittsburgh. Annual capacity, 50,000 tons.
- Pittsburgh (The) Tube Company, Pittsburgh. Sizes, from ½ to 12 inches. Annual capacity, 40,000 tons.
- Reading Iron Company, Reading. Sizes, from ¾ to 12 inches. Annual capacity, 60,000 tons.
- Rolled Steel Carriage Wheel Company, P. O. Box 318, Pittsburgh. Works at Kensington. Preparing to make cold-rolled tubes, from ½ to 4 inches.
- Tyler (The) Tube and Pipe Company, Washington. Annual capacity, 15,000 tons.

DELAWARE—1.

- Delaware Iron Company, Morris, Tasker & Co., (incorporated,) New Castle. Office, 224 South Third st., Philadelphia. *See Pennsylvania.*

WEST VIRGINIA—1.

- Riverside Iron Works, Wheeling. Works at Benwood. Sizes, from ½ to 8 inches. Annual capacity, 30,000 tons.

OHIO—4.

- American Tube and Iron Company, Youngstown. Main office, 98 John st., New York; general office, Middletown, Pa. Sizes, from 1½ to 20 inches. Annual capacity, 27,000 tons. *See Pennsylvania.*

Kellogg (The) Seamless Tube and Manufacturing Company, Findlay.
Eastern office, 40 Water St., Boston. Sizes, from 2 to 5 inches. Preparing to make larger sizes.

Paige (The) Tube Company, Warren. Sizes, from $\frac{3}{4}$ to 8 inches. Annual capacity, 30,000 tons.

Shelby (The) Steel Tube Company, Shelby. Sizes, from $\frac{1}{4}$ to $1\frac{3}{4}$ inches. Annual capacity, 400 tons.

ILLINOIS—2.

Crane Company, 10 North Jefferson st., Chicago.

Western Tube Company, (successor to Haxtun Steam Heater Company,) Kewanee.

CALIFORNIA—1.

Risdon Iron and Locomotive Works, San Francisco. Product, wrought iron and steel rivetted pipe. Sizes, from 4 inches up. Annual capacity, 10,000 tons.

UNITED STATES.

Total number of wrought-iron pipe works in the United States: 31.

CAST-IRON PIPE WORKS.

MASSACHUSETTS—1.

Davis and Farnum Manufacturing Company, Waltham. Sizes, from 2 to 30 inches.

NEW YORK—2.

Buffalo Cast Iron Pipe Company, 370 Exchange st., Buffalo. Sizes, from 3 to 36 inches. Daily melting capacity, 60 tons.

Utica (The) Pipe Foundry Company, Utica. Sizes, from 3 to 30 inches. Daily melting capacity, 50 tons.

NEW JERSEY—6.

Gloucester Iron Works, Gloucester City. Sizes, from $1\frac{1}{2}$ to 48 inches. Daily melting capacity, 125 tons.

McNeal (The) Pipe and Foundry Company, Burlington. New York office, 52 Wall st. Sizes, from $1\frac{1}{2}$ to 48 inches. Daily melting capacity, 200 tons.

Warren Foundry and Machine Company, Phillipsburg. Office, 160 Broadway, New York. Sizes, from 3 to 48 inches. Daily melting capacity, 225 tons.

Wood (R. D.) & Co., 400 Chestnut st., Philadelphia. Foundries at Millville, Camden, and Florence.

PENNSYLVANIA—11.

Allison, (L. S.,) Hazleton and Minersville. Two works: Hazleton Works; sizes, from 2 to 18 inches; daily melting capacity, 6½ tons. Minersville Works; sizes, from 4 to 22 inches; daily melting capacity, 40 tons.

Carbon Iron and Pipe Company Limited, Mauch Chunk. Works at Parryville. Sizes, from 3 to 6 inches. Daily melting capacity, 15 tons.

Emaus Pipe Foundry, Donaldson Iron Company, Emaus. Main office, 136 South Fourth st., Philadelphia. Sizes, from 3 to 16 inches. Daily melting capacity, 85 tons.

Fisher Pipe Manufacturing Company, Allentown. Sizes, from 2 to 6 inches. Daily melting capacity, 45 tons.

Jackson (The) and Woodin Manufacturing Company, Berwick. Sizes, 3 to 12 inches inclusive. Daily melting capacity, 45 tons.

Lansdale Iron Works, Henry M. Kolb, Lansdale. Soil pipe.

Mellert Foundry and Machine Company Limited, Reading. Sizes, from 3 to 48 inches. Daily melting capacity, 40 tons.

National Foundry and Pipe Works Limited, Scottsdale. Sizes, from 3 to 30 inches. Daily melting capacity, 75 tons.

Reading Foundry Company Limited, Reading. Sizes, from 3 to 48 inches. Daily melting capacity, 80 tons.

Sayre Pipe Foundry Company, Sayre. Idle.

VIRGINIA—2.

Hill City Pipe Works, The Glamorgan Company, Lynchburg. Sizes, from 3 to 20 inches. Daily melting capacity, 50 tons.

Radford (The) Pipe and Foundry Company, Cincinnati, Ohio. Works at Radford. *See Alabama.*

KENTUCKY—1.

Dennis Long & Company, P. O. Box 9, Louisville. All sizes. Daily melting capacity, 250 tons.

TENNESSEE—2.

Chattanooga Foundry and Pipe Works, Chattanooga. *See Alabama.*

South Pittsburg Pipe Works, South Pittsburg. Sizes, from 3 to 16 inches. Daily melting capacity, 75 tons.

ALABAMA—5.

Alabama Pipe Company, Bessemer. Soil pipe exclusively. Sizes, from 2 to 6 inches. Daily melting capacity, 30 tons; finished work, 20 tons.

Anniston Pipe Works, The Radford Pipe and Foundry Company, lessee, Cincinnati, Ohio. Works at Anniston. Sizes, from 3 to 36 inches. Daily melting capacity, 200 tons. *See Virginia.*

Chattanooga Foundry and Pipe Works, Chattanooga, Tenn. Works at Bridgeport. Sizes, from 24 to 48 inches. Daily melting capacity, 100 tons. *See Tennessee.*

Hercules Foundry Company, 518 Exchange Building, Boston, Mass. Works at Pell City. Soil pipe. Sizes, from 2 to 12 inches inclusive. Daily melting capacity, 50 tons.

Howard-Harrison Iron Company, Bessemer. Offices at Bessemer and St. Louis, Mo. Sizes, from 4 to 60 inches. Daily melting capacity, 300 tons.

TEXAS—2.

New Birmingham Pipe Works, New Birmingham. Sizes, from 4 to 16 inches. Daily melting capacity, 40 tons.

Rusk Penitentiary Pipe Works, State of Texas, R. W. Finley, Financial Agent, Rusk. Sizes, from 3 to 36 inches. Daily melting capacity, 75 tons.

OHIO—4.

Addyston (The) Pipe and Steel Company, Cincinnati. Works at Addyston. Sizes, from 2 to 60 inches. Daily melting capacity, 450 tons. Cleveland (The) Pipe Works Company, New Philadelphia. Idle, but intends soon to go into operation.

Lake Shore Foundry, Cleveland. Sizes, from 3 to 48 inches inclusive. Daily melting capacity, 300 tons.

Ohio (The) Pipe Company, Columbus. Sizes, from 3 to 30 inches. Daily melting capacity, 100 tons.

ILLINOIS—1.

Massac Iron Company, Metropolis. Sizes, from 4 to 8 inches. Daily melting capacity, 30 tons.

MICHIGAN—1.

Detroit Pipe and Foundry Company, Detroit. Sizes, from 3 to 30 inches. Daily melting capacity, 80 tons.

WISCONSIN—1.

West Superior Iron and Steel Company, West Superior. Sizes, from 4 to 24 inches. Daily melting capacity, 60 tons.

MISSOURI—2.

Shickle, Harrison, and Howard Iron Company, St. Louis. Sizes, from 3 to 60 inches. Daily melting capacity, 200 tons.

South St. Louis Foundry, St. Louis. Works at South St. Louis. Sizes, from 4 to 20 inches. Daily melting capacity, 50 tons.

COLORADO—1.

Colorado Coal and Iron Company, Pueblo. Sizes, from 3 to 24 inches inclusive. Daily melting capacity, 60 tons.

OREGON—1.

Oregon (The) Iron and Steel Company, Oswego. Main office, Portland.
Sizes, from 3 to 24 inches. Daily melting capacity, 25 tons.

UNITED STATES.

Total number of cast-iron pipe works in the United States: 43.

CAR-AXLE WORKS.

NOTE.—The following list does not include railroad companies which make car axles. The annual capacity in axles is given in number of axles in all cases where manufacturers have furnished this information.

MAINE—1.

Eastern Forge Company, Room 78, Mason Building, Boston, Mass.
Works at Portland. Annual capacity, 15,000.

NEW HAMPSHIRE—2.

Cole Manufacturing Company, Lakeport. Annual capacity, 5,000.
Nashua Iron and Steel Company, Nashua. Annual capacity, 12,000.

MASSACHUSETTS—3.

Boston Forge Company, East Boston. Annual capacity, 12,000.
Cape Ann Anchor Works, Gloucester.
Talcott (N. W.) Axle Works, S. & W. C. Lawton, Brightwood. Annual capacity, 6,000.

CONNECTICUT—1.

Bridgeport Forge Company, Bridgeport.

NEW YORK—8.

Buffalo Steam Forge, Buffalo. Annual capacity, 30,000.
Central Forge Works, Whitestone, Long Island.
DeLaney Forge and Iron Company, Buffalo. Locomotive axles only.
Globe Iron Works, Edward C. White, 556 West Thirty-fourth st., New York City. Special sizes only.
Gould Coupler Company, 120 Broadway, New York City. Works at Buffalo. Annual capacity, 7,200 locomotive or 60,000 car axles.
Peckham Motor Truck and Wheel Company, Kingston, N. Y.
Sizer, (W. S.,) Buffalo. Annual capacity, 18,000.
Troy Steel and Iron Company, Troy. New York office, 26 Broadway. Annual capacity, 15,000.

NEW JERSEY—3.

Paterson Iron Company, Paterson. Annual capacity, 18,000.

Taylor Iron and Steel Company, High Bridge, Hunterdon county. Annual capacity, 36,000.

Union Steam Forge, Macpherson, Willard & Co., Bordentown. Works at White Hill Station.

PENNSYLVANIA—21.

Allentown (The) Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown.

Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Open-hearth steel axles, annealed and tempered by the Coffin process. Annual capacity, 50,000.

Carnegie, Phipps & Co., Limited, Pittsburgh. Annual capacity, 70,000.

Catasauqua Manufacturing Company, Catasauqua. Annual capacity, 30,000.

Dickson Manufacturing Company, Scranton. Manufactures axles for its own use only.

Erie Forge Company Limited, Erie. Not making car axles at present.

Frankford Steel Company, Adam Tindel, proprietor, Frankford, Philadelphia. Annual capacity, 2,000 locomotive and 8,000 passenger axles.

Green Ridge Iron Works, Scranton. Mine car axles.

Jackson (The) and Woodin Manufacturing Company, Berwick.

Lackawanna (The) Iron and Steel Company, Scranton. Mine car axles only.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Works at Fullerton. Daily capacity, 80.

Lewisburg Steam Forge Company, Lewisburg. Idle.

Lockhart Iron and Steel Company, Pittsburgh. Annual capacity, about 20,000.

Midvale Steel Company, Nicetown, Philadelphia.

Milton (The) Iron Company, Milton. Annual capacity, 10,000.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works at Pencoyd. Annual capacity, 70,000.

Penn Iron Company Limited, Lancaster. Hammered and rolled axles.

Pennsylvania Steel Company, 208 South Fourth st., Philadelphia. Works at Steelton. Mine car axles only.

Pittsburgh Forge and Iron Company, Pittsburgh. Works at Allegheny City. Annual capacity, 76,000.

Sayre Steam Forge, Cayuta Wheel and Foundry Company, Sayre. Annual capacity, 5,000. Idle.

Sheldon Axle Company, Wilkesbarre. Wagon and carriage and mine car axles only.

DELAWARE—1.

Johnson Forge Company, Wilmington. Annual capacity, 35,000.

MARYLAND—1.

Cumberland Steel and Iron Company, Cumberland. Intends to make axles when company is fully organized.

VIRGINIA—2.

Richmond Steam Forge, Richmond. Works at Manchester. Annual capacity, 90,000.

Tredegear Iron Works, Tredegear Company, Richmond. Annual capacity, 20,000.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Annual capacity, 15,000.

KENTUCKY—1.

Louisville Steam Forge Company, Louisville. Annual capacity, 30,000.

ALABAMA—2.

United States Rolling Stock Company, Anniston. Daily capacity, 160. George Peacock, Selma. Mine car axles.

OHIO—6.

Akron Steam Forge Company, Akron. Annual capacity, 18,000.

Cincinnati (The) Forge and Iron Company, Cincinnati. Annual capacity, 50,000.

Cleveland City Forge and Iron Company, Cleveland. Annual capacity, 110,000.

Donner & Dutton, Cleveland. Annual capacity, 7,500 street car axles.

Lake Erie Iron Company, Cleveland. Annual capacity, 48,000.

Otis (The) Steel Company Limited, Cleveland. Annual capacity, 75,000 to 100,000.

INDIANA—4.

Bass Foundry and Machine Works, Fort Wayne.

Central (The) Iron and Steel Company, Brazil. Annual capacity, 24,000.

National Forge and Iron Works, Weaver, Getz & Co., Chicago. Works at East Chicago. Idle.

New Albany Forge and Rolling Mill, New Albany. Annual capacity, 40,000.

ILLINOIS—3.

Chicago Forge and Bolt Company, Fortieth st. and Stewart ave., Chicago. Annual capacity, 50,000.

Pullman's Palace Car Company, Pullman. All kinds.

Willard (The) Sons & Bell Company, 708 Phoenix Building, Chicago. Works at South Chicago. Annual capacity, 40,000.

MICHIGAN—2.

Michigan Forge and Iron Company, (successor to Baugh Steam Forge Company,) Detroit.

West Michigan Car and Machine Company, Muskegon. Idle.

MINNESOTA—2.

Duluth Manufacturing Company, Duluth. Annual capacity, 6,000.
Harris Forge and Rolling Mill Company, Irondale, Ramsey county.

MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis. Annual capacity, 31,000.
St. Louis Steam Forge and Iron Works, Main and Miller sts., St. Louis. Annual capacity, 24,000.

UTAH TERRITORY—1.

Sun Foundry, William J. Silver, Superintendent, Provo City. Mine and ore car axles. Annual capacity, 1,000.

CALIFORNIA—2.

Pacific Rolling Mill Company, 202 Market st., San Francisco. Annual capacity, 4,000.
Risdon Iron and Locomotive Works, San Francisco. Mine and freight car axles.

UNITED STATES.

Total number of car-axle works in the United States: 69.

CAR-WHEEL WORKS.

NOTE.—The following list does not include railroad companies which make car wheels. The figures of capacity in the works named below relate to the number of wheels and not to tonnage.

MAINE—1.

Portland Company, Portland. Product, cast iron wheels. Annual capacity, 7,500.

NEW HAMPSHIRE—2.

Ford & Kimball, Concord. Product, cast iron wheels.
Laconia (The) Car Company, Laconia. Product, cast iron wheels. Annual capacity, 12,000.

VERMONT—2.

Miltimore Elastic Steel Car Wheel Company, Arlington. Product, steel wheels. Daily capacity, 25. Idle.
St. Albans Foundry Company, St. Albans. Product, cast iron wheels. Annual capacity, 10,000.

MASSACHUSETTS—3.

American Steel Wheel Company, South Boston. Boston office, 183 Summer st. General office, 143 Liberty st., New York. Product, solid steel car wheels. Annual capacity, 15,000. *See New Jersey.*
Swett Car Wheel and Foundry Company, Allston. Works at Allston and Chelsea. Product, cast iron wheels. Daily capacity, 200.

CONNECTICUT—2.

Barnum Richardson Company, Lime Rock. Product, cast iron wheels. Annual capacity, 25,000.
Washburn Car-wheel Company, Hartford. Product, crucible-steel-tired wheels. Annual capacity, 5,000.

NEW YORK—10.

Allen Paper Car Wheel Company, Chicago, Ill., and 31 Broadway, New York. Works at Hudson, N. Y., and Pullman, Ill. Product, steel-tired wheels, paper and metal centres. Annual capacity, 12,000. *See Illinois.*
Brooks Locomotive Works, Dunkirk. Product, Thurber steel-tired wheels.
Buffalo Car Wheel Works, 120 Broadway, New York. Works at Buffalo. Product, cast iron wheels. Annual capacity, 50,000.
Globe Iron Works, Edward C. White, 556 West Thirty-fourth st., New York City. Product, cast iron street car wheels. Annual capacity, 20,000.
New York Car Wheel Works, Buffalo. Product, "machined" chilled cast iron wheels. Annual capacity, 100,000.
Peckham Motor Truck and Wheel Company, Kingston. Product, patent interchangeable 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 railroad and street car wheels. Annual capacity, 60,000 railroad and 40,000 street car wheels.
Rood & Brown, Buffalo. Product, cast iron wheels. Annual capacity, 50,000.
Thacher (Geo. H.) & Co., Albany. Product, cast iron wheels. Annual capacity, 70,000.

NEW JERSEY—3.

American Steel Wheel Company, 143 Liberty st., New York. Contemplates erecting works at Garwood. *See Massachusetts.*
Jersey City (The) Wheel Foundry and Machine Works, 151 Greene st., Jersey City. Product, cast iron wheels and Thomas steel-tired

wheels. Annual capacity, 30,000 cast chilled and 3,000 steel-tired wheels.

Taylor Iron and Steel Company, High Bridge. Product, chilled iron and steel-tired wheels. Annual capacity, 40,000 cast iron and 5,000 steel-tired.

Washburn Hunts Company, Jersey City. Product, cast iron wheels. Annual capacity, 25,000. Idle.

PENNSYLVANIA—17.

Boies Steel Car Wheel Works, The Boies Steel Wheel Company, Scranton. Product, steel-tired wheels. Annual capacity, 7,500.

Chester Steel Castings Company, Chester. Office, 407 Library st., Philadelphia. Steel wheels.

Connellsville Machine and Car Company, Connellsville. Product, mine car wheels. Annual capacity, 20,000.

Davenport & Fairbairn, Erie. Product, all kinds of cast iron wheels. Annual capacity, 110,000.

Harman & Hassert, Bloomsburg. Product, cast iron mine car wheels. Annual capacity, 20,000.

Harrisburg Car Manufacturing Company, Harrisburg. Product, cast iron wheels. Annual capacity, 36,000.

Hazleton Iron Works, L. S. Allison, Hazleton. Product, mine car wheels. Annual capacity, 15,000.

Hockensmith & Wagoner, Irwin. Product, mine car wheels. Annual capacity, 52,000.

Hodge (The) Manufacturing Company, Greenville. Product, mine car wheels. Annual capacity, 10,000.

Huntingdon Car and Car Wheel Works, The Iron Car Equipment Company, 41 Wall st., New York. Works at Huntingdon, Pa. Product, chilled cast iron wheels for freight cars. Annual capacity, 30,000.

Jackson (The) and Woodin Manufacturing Company, Berwick. Product, freight and mine chilled cast iron wheels. Annual capacity, 60,000 freight and 18,000 mine car wheels.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Works at Fullerton. Product, cast iron and steel-tired wheels. Daily capacity, 300.

Marshall, (John,) Kittanning. Product, pit car wheels. Annual capacity, 3,000.

Redstone Foundry, J. V. Graft & Co., Uniontown. Product, pit car wheels. Annual capacity, 12,480.

Sax's Interlocking Steel Tired Car Wheel Works, Sax & Mosier, Pittston, Luzerne county. Product, steel-tired wheels. Daily capacity, 40 wheels.

Sayre Steam Forge, The Cayuta Wheel and Foundry Company, Sayre,

Bradford county. Product, all kinds of cast iron wheels. Annual capacity, 70,000.

Whitney (A.) & Sons, Callowhill and Sixteenth streets, 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 (The) Car Wheel Company, Baltimore. Product, all kinds of wheels. Annual capacity, 120,000.

VIRGINIA—4.

Old Atlantic Iron Works, W. A. Anderson, Norfolk. Product, cast iron tram wheels. Annual capacity, from 1,500 to 2,000.

Portsmouth Iron Works, John F. Clarke, Jr., Portsmouth. Product, chilled and bogie wheels. Annual capacity, 2,400.

Roanoke Machine Works, Roanoke. Cast iron chilled wheels. Annual capacity, about 30,000.

Tredegar Company, Richmond. Product, all kinds of cast iron railroad car 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. Annual capacity, 30,000.

TENNESSEE—2.

Chattanooga Car and Foundry Company, Chattanooga. Product, cast iron wheels. Daily capacity, 80 tons.

Knoxville Car Wheel Company, Knoxville. Product, cast iron wheels.

ALABAMA—4.

Bluffton Car Wheel Company, Bluffton. Product, cast iron wheels. Daily capacity, 200.

Decatur Car Wheel and Manufacturing Company, New Decatur. Product, chilled cast iron wheels. Annual capacity, 50,000.

Peacock's Iron Works, George Peacock, Selma. Product, patent self-oiling tram wheels. Annual capacity, 35,000; also 15,000 small plate wheels.

United States Rolling Stock Company, A. Hegewisch, Receiver, An-niston. New York office, 35 Wall st. Product, cast iron chilled wheels. Annual capacity, 60,000.

TEXAS—3.

- Dickson Car Wheel Company, Houston. Product, cast iron wheels. Annual capacity, 50,000.
- Lone Star (The) Iron Company, Jefferson. Expects to begin making wheels early in 1892.
- Marshall Car Wheel and Foundry Company, Marshall. Product, cast iron car and engine truck wheels. Annual capacity, 50,000.

OHIO—11.

- Barney and Smith Manufacturing Company, Dayton. Product, cast iron wheels. Annual capacity, 50,000.
- Cleveland Foundry, Bowler & Co., Cleveland. Product, chilled and steel-tired street and railroad wheels. Annual capacity, 100,000.
- Cleveland Wheel and Foundry Works, Maher & Brayton, Cleveland. Product, cast iron wheels.
- Dorner & Dutton, Cleveland. Product, chilled iron wheels. Annual capacity, 25,000.
- Fulton Foundry Company, Cleveland. Product, steam, street, steel-tired, and mine car wheels. Annual capacity, 10,000 steam, 10,000 street, and 1,200 steel-tired wheels.
- Lima Machine Works, Lima. Product, chilled cast iron and steel-tired wheels. Annual capacity, 6,000 chilled and 1,000 steel-tired.
- Lima Shops, Lafayette Car Works, Lima, Allen county. Main office, Lafayette, Indiana. Product, cast iron wheels. *See Lafayette Car Works, Indiana.*
- Mowry Car Wheel Works, 681 Eastern ave., Cincinnati. Product, cast iron wheels.
- Nelsonville Foundry and Machine Company, Nelsonville. Product, self-oiling chilled mine car wheels. Annual capacity, 20,000.
- Paige Car Wheel Company, 185 Euclid ave., Cleveland. Product, steel-tired wheels. Annual capacity, 14,000.
- Watt (The) Mining Car Wheel Company, Barnesville. Product, self-oiling chilled mine car wheels. Annual capacity, 60,000.

INDIANA—9.

- Bass Foundry and Machine Works, Fort Wayne. Product, cast iron wheels.
- Cushion Car Wheel Company, Indianapolis. Product, either cast iron or steel centre and steel-tired wheels.
- Haskell and Barker Car Company, Michigan City. Product, cast iron wheels. Annual capacity, 75,000.
- Indiana Car and Foundry Company, Indianapolis. Product, chilled cast iron wheels. Daily capacity, 200.
- Lafayette Car Works, Lafayette. Product, cast iron wheels. Annual capacity, 90,000 car and 6,000 engine wheels. *See Lima Shops, Ohio.*

Ohio Falls Car Company, Jeffersonville. Product, cast iron wheels. Annual capacity, 75,000.

Stedman's Foundry and Machine Works, Aurora. Product, cast iron wheels.

Terre Haute Car and Manufacturing Company, Terre Haute. Product, chilled cast iron wheels. Annual capacity, 50,000.

Treat (C. A.) Manufacturing Company, East Chicago. Office, Hannibal, Missouri. Product, cast iron wheels. Annual capacity, 40,000. *See Missouri.*

ILLINOIS—12.

Allen Paper Car Wheel Company, Chicago. Works at Pullman, Cook county, Ill., and Hudson, N. Y. Product, paper and metal centre steel-tired wheels, for coach, engine, truck, tender, and street cars. Annual capacity, 18,000. *See New York.*

Barnum and Richardson Manufacturing Company, 64 South Jefferson st., Chicago. Product, cast iron wheels.

Bass, (J. H.), 97 Dearborn st., Chicago. Works at Clark and Forty-seventh sts. Product, cast iron wheels. Annual capacity, 45,000.

Bouton & Co., Chicago. Works at Aurora. Product, cast iron wheels. Annual capacity, 36,000.

Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Works, Stony Island ave. and Ninety-fifth st. Product, rolled steel wheels. Annual capacity, 75,000.

Griffin Wheel and Foundry Company, Phoenix Building, Chicago. Works at Sacramento ave. and C. & N. W. Rwy. Product, chilled cast iron wheels. Daily capacity, 800.

Litchfield Car and Machine Company, Litchfield. Product, cast iron wheels. Annual capacity, 37,000.

Madison Car Company, Madison. Product, chilled iron wheels. Annual capacity, 120,000.

Mt. Vernon Car Manufacturing Company, Mt. Vernon. Cast iron wheels. Annual capacity, 65,000.

Steel (The) Truss Car Wheel Company, Shenandoah and Buena Vista sts., St. Louis. Works at Edwardsville. Steel-tired, steel centre wheels.

Union Foundry and Pullman Car Wheel Works, Pullman. Product, chilled cast iron wheels. Annual capacity, 100,000.

Wells (The) and French Company, Phoenix Building, Chicago. Works at Paulina and Blue Island avenues. Product, chilled wheels. Annual capacity, 75,000.

MICHIGAN—8.

Butterworth & Lowe, Grand Rapids. Product, logging car wheels. Annual capacity, 9,000.

Detroit Car Wheel Company, Newberry Building, Detroit. Works at Grand Trunk Junction, West Detroit. Product, cast iron wheels. Annual capacity, 120,000.

- Griffin Car Wheel Company, Detroit. Product, cast iron wheels. Annual capacity, 75,000.
- Kalamazoo Railroad Velocipede and Car Company, Kalamazoo. Product, velocipede, hand, and mine car wheels. Annual capacity, 20,000.
- Lake Shore Iron Works, Marquette. Product, mine car wheels. Annual capacity, from 1,000 to 1,200.
- Peninsular Car Company, Detroit. Product, chilled cast iron wheels. Annual capacity, 90,000.
- Russel Wheel and Foundry Company, Detroit. Product, chilled cast iron wheels. Annual capacity, 14,000.
- West Michigan Car and Machine Company, Muskegon. Idle.

WISCONSIN—1 BEING REMOVED.

- Milwaukee Car Wheel and Foundry Company, Milwaukee. Product, chilled cast iron wheels. Annual capacity, 50,000. Removing plant to St. Paul, Minn.

MINNESOTA—3.

- Duluth Manufacturing Company, Duluth. Works at West Duluth. Annual capacity, 40,000.
- Northwestern Foundry, Menzel & Ferguson, Minneapolis. Not now making car wheels.
- St. Paul Foundry Company, St. Paul. Product, cast iron wheels. Annual capacity, 10,000.

MISSOURI—5.

- Kansas City Car and Wheel Company, Houser Building, St. Louis. Works at Birmingham. Annual capacity, 30,000.
- Missouri Car and Foundry Company, Houser Building, St. Louis. Product, cast iron wheels. Annual capacity, 180,000.
- St. Charles Car Company, St. Charles. Product, chilled charcoal cast iron wheels. Annual capacity, 86,000.
- St. Louis Car Wheel Company, St. Louis. Product, cast iron wheels. Daily capacity, 200.
- Treat (C. A.) Manufacturing Company, Hannibal. Product, cast iron wheels. Annual capacity, 25,000. *See Indiana.*

UTAH—1.

- Sun Foundry, Wm. J. Silver, Provo City. Product, mine car wheels, chilled and unchilled. Annual capacity, about 2,000.

CALIFORNIA—2.

- Occidental Foundry, Steiger & Kerr, 137 First st., San Francisco. Product, locomotive and street car wheels. Annual capacity, 10,000.
- Risdon Iron and Locomotive Works, San Francisco. Product, mine and railway car wheels.

UNITED STATES.

Total number of car-wheel works in the United States: 109.

CARBUILDERS.

NOTE.—This list does not include railroad companies which build cars.

MAINE—1.

Portland Company, Portland. Annual capacity, 300 flat and 150 box cars.

NEW HAMPSHIRE—1.

Laconia (The) Car Company, Laconia, Belknap county. Annual capacity, 1,500 freight and 50 passenger cars.

MASSACHUSETTS—7.

Bradley Car Works, Osgood Bradley & Sons, Worcester. Annual capacity, 100 passenger and 700 freight cars.

Briggs Carriage Company, Amesbury. Street cars only. Annual capacity, 200.

Ellis Car Company, Amesbury. Street cars and electric snow plows. Annual capacity, 400 cars and 100 plows.

Keith Manufacturing Company, Sagamore. Freight cars only. Annual capacity, 600.

Newburyport Car Manufacturing Company, Newburyport. Street cars only.

Randall Street and Electric Manufacturing Company, 1131 Tremont st., Boston. Street and electric cars of all kinds. Annual capacity, from 100 to 300.

Wason Manufacturing Company, Brightwood. Works at Springfield. Daily capacity, 1 passenger and 6 freight cars.

NEW YORK—11.

Buffalo Car Manufacturing Company, Buffalo. All kinds of freight cars.

Feigel (The) Car Company, Van Pelt Manor, Kings county. Street cars only.

Gilbert Car Manufacturing Company, Troy. All kinds for both steam and street railways.

Hunt (C. W.) Company, 45 Broadway, New York City. Works at West New Brighton. Iron or wooden flat, tip, and charging narrow-gauge cars. Annual capacity, 500.

Jones' Car Works, J. M. Jones' Sons, West Troy. Street cars only. Annual capacity, 500.

Lewis (The) and Fowler Manufacturing Company, 29 Walworth st., Brooklyn. Street cars only.

Ramapo Iron Works, Hillburn, Rockland county. Plantation, mine, and logging cars.

Stephenson (John) Company Limited, 47 East Twenty-seventh st., New York City. Street cars of all kinds. Annual capacity, 700.

Stuebner (G. L.) & Co., Long Island City. Narrow-gauge coal and ore cars.

Turl (John) & Sons, New York City. Works on West Twenty-eighth st. Plantation and mine cars.

Wagner Palace Car Company, East Buffalo. Sleeping, dining, buffet, etc., cars. Annual capacity, 150.

NEW JERSEY—1.

McEwen, (A. C.) 91 Morgan st., Jersey City. Contractors' dump, and narrow-gauge cars of all kinds. Annual capacity, 2,500 dump cars and 1,800 of other kinds.

PENNSYLVANIA—24.

Allison, (L. S.) Hazleton. Works at Hazleton and Minersville. Mine cars only.

Allison (The) Manufacturing Company, Thirty-second and Walnut sts., Philadelphia.

Altoona Manufacturing Company, Altoona, Blair county. Freight cars.

Billmeyer and Small Company, York. Annual capacity, 200 passenger and 1,500 freight cars.

Bloomsburg Car Company, Bloomsburg. Freight and mine cars. Annual capacity, 1,200.

Carlisle Manufacturing Company, Carlisle. Freight and mine cars. Annual capacity, 3,000.

Connellsville Machine and Car Company, Connellsville. Coke and mine cars.

Dauphin Car Works, Dauphin. Annual capacity, 2,500 gondola cars. Idle. To be sold.

Empire Car Works, York, York county. Idle.

Erie Car Works Limited, Erie. Annual capacity, 6,000 freight cars.

Glen Rock Manufacturing Company, Glen Rock. Works destroyed by fire. Harrisburg people negotiating for the purchase of the property with the intention of rebuilding the plant.

Harman & Hassert, Bloomsburg. Annual capacity, 2,000 mine and construction cars.

Harrisburg Car Manufacturing Company, Harrisburg. Annual capacity, 4,000 freight cars.

Hockensmith & Wagoner, Irwin, Westmoreland county. Mine cars. Annual capacity, 2,500.

- Huntingdon Car and Car Wheel Works, The Iron Car Equipment Company, 41 Wall st., New York City. Works at Huntingdon. Annual capacity, 3,000 freight cars.
- Jackson (The) and Woodin Manufacturing Company, Berwick. Annual capacity, 4,000 freight cars.
- Lamokin Car Works, E. H. Wilson & Co., Chester. Philadelphia office, 222 South Third st. Works at Lamokin Station, near Chester. Annual capacity, 50 passenger, 360 street, and 150 freight cars.
- Lebanon Manufacturing Company, Lebanon. Annual capacity, 3,000 freight, refrigerator, and mine 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, Arthur King, Middletown. Annual capacity, 2,500 freight cars.
- Milton Car Works, Murray, Dougal & Co. Limited, Milton. Annual capacity, 3,500 freight cars.
- Pardee Car and Machine Works, Watsonstown. Annual capacity, 2,100 freight cars.
- Philadelphia Car Works, J. G. Brill Company, Sixty-second st. and Woodland ave., Philadelphia. Annual capacity, 100 passenger, 500 freight, and 1,200 street cars, and 1,200 electric motor trucks.

DELAWARE—2.

- Delaware Car Works, Jackson and Sharp Company, Wilmington. Sleeping, parlor, and other passenger cars, and freight cars. Annual capacity, 400 passenger cars.
- Harlan (The) and Hollingsworth Company, Wilmington. New York office, 86 Boreel Building, 115 Broadway; London office, Dashwood House, 9 New Broad st., E. C. All kinds of parlor, boudoir, sleeping, and other passenger cars and baggage cars. Annual capacity, 400.

MARYLAND—2.

- Ryan-McDonald Manufacturing Company, 44 South st., Baltimore. Narrow-gauge and contractors' cars of all kinds. Annual capacity, 2,500.
- South Baltimore Car Works, 44 South st., Baltimore. Annual capacity, 3,500 freight cars.

VIRGINIA—3.

- Basic City Car Works Company, Basic City. Annual capacity, 2,500 freight cars. Not yet in operation.
- Roanoke Machine Works, Roanoke. Annual capacity, 3,500 freight and 25 passenger cars.
- Tredegar (The) Company, Richmond. Annual capacity, 2,000 freight cars.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Annual capacity, 4,500 freight cars.

TENNESSEE—2.

Chattanooga Car and Foundry Company, Chattanooga. Annual capacity, 1,000 freight, 1,000 mine, and 2,000 cane cars.

Southern Car Works, Knoxville. All kinds of freight and mine cars. Daily capacity, from 6 to 8.

NORTH CAROLINA—1.

North Carolina (The) Car Company, Raleigh. Annual capacity, 300 freight cars.

ALABAMA—4.

Elliott (The) Car Company, Gadsden. Annual capacity, 2,000 freight cars.

Peacock's Iron Works, George Peacock, Selma. Mine cars.

United States (The) Rolling Stock Company, A. Hegewisch, Receiver, Anniston. New York office, 35 Wall st. Works at Anniston and New Decatur. Annual capacity, 4,500 freight cars at each place. *See Ohio and Illinois.*

TEXAS—1.

Tyler Car and Lumber Company, Tyler. Freight cars.

OHIO—8.

Barney and Smith Manufacturing Company, Dayton. Annual capacity, 350 sleeping and other passenger and baggage cars and 6,000 freight cars.

Blaine Car Manufacturing Company, Dayton. Annual capacity, from 500 to 1,000 side dump cars.

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.

United States (The) Rolling Stock Company, A. Hegewisch, Receiver, Urbana. New York office, 35 Wall st. Annual capacity, 2,500 gondola or flat cars and 2,000 box cars. *See Alabama and Illinois.*

Watt (The) Mining Car Wheel Company, Barnesville. Mine cars only.

Youngstown (The) Car Manufacturing Company, Youngstown. Annual capacity, 3,000 freight cars.

INDIANA—5.

Haskell and Barker Car Company, Michigan City. Annual capacity, 6,000 freight cars of all kinds.

Indiana Car and Foundry Company, Indianapolis. Daily capacity, 20 freight cars.

Lafayette Car Works, Lafayette. Annual capacity, 4,500 freight cars.

See Lima Shops, Ohio.

Ohio Falls Car Company, Jeffersonville. Annual capacity, 6,000 freight and 300 passenger cars.

Terre Haute Car and Manufacturing Company, Terre Haute. All kinds of freight cars. Annual capacity, 4,000.

ILLINOIS—8.

Corey (The) Car and Manufacturing Company, 55 Fifth ave., Chicago.

Works, corner of Ashland and Carroll aves. Dump and mine cars.

Harvey Steel Car and Repairing Works, 821 Rookery Building, Chicago. Works at Harvey. Steel and wooden freight cars.

Litchfield Car and Machine Company, Litchfield. Annual capacity, 4,500 freight and 100 passenger cars.

Madison Car Company, Madison. Annual capacity, 12,000 freight cars.

Mt. Vernon Car Manufacturing Company, Mt. Vernon. Annual capacity, 5,000 freight, refrigerator, and caboose cars.

Pullman's Palace Car Company, Pullman. Passenger, street, and freight cars.

United States (The) Rolling Stock Company, A. Hegewisch, Receiver, Hegewisch. New York office, 35 Wall st. Annual capacity, 6,000 freight and 150 passenger cars. *See Ohio and Alabama.*

Wells (The) and French Company, Chicago. Annual capacity, 6,000 freight, refrigerator, and caboose cars.

MICHIGAN—5.

Kalamazoo Railroad Velocipede and Car Company, Kalamazoo. Velocipede, hand, push, mine, and sugar-cane cars. Annual capacity, 4,000 to 5,000.

Michigan Car Company, Detroit. Annual capacity, 10,000 freight cars.

Peninsular Car Company, Detroit. Annual capacity, 10,000 freight cars.

Pullman's Palace Car Company, Detroit. Passenger and street cars.

West Michigan Car and Machine Company, Muskegon. Idle.

MINNESOTA—3.

Duluth Manufacturing Company, Duluth. Annual capacity, 4,500 freight and 3,500 ore, lumber, and mine cars.

Iron Bay Company, West Duluth. Tram cars only.

Northern Car Company, Minneapolis. Annual capacity, 400 street and suburban cars.

MISSOURI—7.

Brownell Car Company, 2300 North Broadway, St. Louis. Street cars only. Annual capacity, 600.

Kansas City Car and Wheel Company, Houser Building, St. Louis. Works at Birmingham. Daily capacity, 10 freight cars.

Laclede (The) Car Company, 4500 North Second st., St. Louis. Street cars only. Daily capacity, 10.

Missouri Car and Foundry Company, Houser Building, St. Louis. Annual capacity, 9,000 freight and 1,000 logging cars.

St. Charles Car Company, St. Charles. Annual capacity, 6,000 freight and 200 passenger cars.

St. Louis Car Company, St. Louis. Street, cable, and electric cars and suburban coaches.

Whitman Agricultural Company, Eighth st. and Clark ave., St. Louis. Construction, dump, and clay cars. Annual capacity, 3,000.

ARKANSAS—1.

Brinkley Car Works and Manufacturing Company, Brinkley. Box and flat cars.

KANSAS—1.

Burton Stock Car Company, Wichita. Office, Chicago, Ill. All kinds of steam railway cars. Daily capacity, 16.

COLORADO—1.

Woeber Brothers Carriage Company, Denver. Works at South Denver. Cable, electric, and street cars. Annual capacity, 300.

CALIFORNIA—5.

California Car and Millwright Works, John Hammond, 227 Fremont st., San Francisco. Freight, passenger, and street cars. Specialty, cable cars.

Carter Brothers, 42 Market st., San Francisco. Works at Newark. Annual capacity, 500 freight, 50 passenger, and 100 street cars.

Holt Brothers, Stockton. Passenger and street cars.

Risdon Iron and Locomotive Works, San Francisco. Flat and mine cars.

Stockton Combined Harvester and Agricultural Works, Stockton. Cable and electric cars. Annual capacity, 100.

UNITED STATES.

Total number of carbuilding works in the United States: 105.

TINPLATE WORKS.

NOTE.—While the word "tinplates" is popularly understood to include both the sheets coated with pure tin and those coated with a mixture of tin and lead, in referring to the product of the works in this list the word "tinplates" will be limited to the pure tin coated sheets. The sheets coated with a mixture of tin and lead will be referred to as "terne" plates, which are mainly used for roofing purposes. The capacity of the works is given in boxes, the box, unless otherwise stated, being understood to be the equivalent of a box of 112 plates 14 inches by 20 inches, and weighing from 108 to 112 pounds. The word "set" refers to the set of tinning pots or the "machine" necessary for the operation of tinning or coating the black plates. "Black plates" are the iron or steel sheets before they are coated. Various kinds of tinning sets are employed at these works, some manufacturers having adopted the Morewood, others the Edwards, others the Leyshon, while others are using tinning apparatus of their own design. The weekly producing capacities of the works are given as reported by the respective manufacturers. A fair day's work of 10 hours with a standard Morewood tinning set is 35 boxes of IC plates, 112 plates, 14 x 20 inches, to the box. Some manufacturers expect to run their works regularly on double turn. The rolling mill or black plate department of the tinplate works which make their own black plates will be found described in the list of rolling mills.

NEW YORK—1, AND 1 BUILDING.

Iron Clad Manufacturing Company, 22-24 Cliff st., New York. Works in Brooklyn. Tinning plant erected about 1876; product, chiefly used in its own works for stamped ware. Buys black plates. Robert Seaman, President and Treasurer; H. B. Haigh, Vice-President; David D. Otis, Secretary; F. E. Young, General Superintendent.

Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn. Building; to contain 6 sets; product to be tinplates; estimated weekly capacity, 2,500 boxes. Will make their own black plates. Isaac Davies, Superintendent. *See Rolling Mills.*

PENNSYLVANIA—12, AND 2 BUILDING.

American Tin and Terne Plate Company, 45 Richmond st., Philadelphia. Works at 55 Laurel st. Built in 1891-2, and first terne plates made January 17, 1892; preparing to make tinplates; 1 set in operation and 1 building; weekly capacity, 150 boxes of terne plates, 20 x 28. Brand, "Keystone." Buys black plates.

Apollo Rolling Mills, Apollo Iron and Steel Company, Pittsburgh. Works at Apollo. Tinning plant added to rolling mill and steel plant in 1891, and first terne plates made December 15, 1891; one set; product, terne plates; weekly capacity, 500 boxes. Enlarging the

- plant. Make their own black plates. George G. McMurtry, President; William B. Rhodes, Secretary; Wallace P. Bache, Treasurer. *See Rolling Mills.*
- Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo. Pittsburgh office, Lewis Building. Tinning plant added to rolling mill in 1891; first terne plates made in May, 1891; one set; product, terne plates; weekly capacity, 150 boxes of 20 x 28 plates. Make their own black plates. P. H. Laufman, President; W. B. Laufman, Secretary; S. M. Jackson, Treasurer; S. A. Gourley, Manager. *See Rolling Mills.*
- Blairsville Rolling Mill and Tin Plate Company, Blairsville, Indiana county. Building; to contain 6 sets, 4 for tinplates and 2 for terne plates; estimated weekly capacity, 1,200 boxes. Will make its own black plates. Jacob Graff, President; John H. Devers, Vice-President; D. M. Fair, Secretary and Manager; T. D. Cunningham, Treasurer. *See Rolling Mills.*
- Griffiths & Cadwallader, Twenty-third Ward, Pittsburgh. Built in 1891, and first terne plates made December 27, 1891; one set; product, terne plates; weekly capacity, 150 boxes, 20 x 28. Buy black plates.
- Hamilton, (John,) 61 and 63 Third ave., Pittsburgh. Built in 1890, and first terne plates made in April, 1890; 2 sets; product, terne plates; weekly capacity, 300 boxes, 20 x 28. Buys black plates.
- McKinley Tin Plate Company Limited, 38 Water st., Pittsburgh. Built in 1891, and first terne plates made January 7, 1892; 2 sets; product, tinplates or terne plates; weekly capacity, 225 boxes of terne plates, 20 x 28, or 400 boxes of tinplates, 14 x 20, 130 lbs. per box. Buys black plates. Intends to build a hot-rolling mill in 1892. L. H. Smith, President and General Manager; H. W. Lowe, Secretary; Charles H. Lowe, Treasurer.
- N. & G. Taylor Company, 305 Branch st., Philadelphia. Erected in 1891; first terne plates made in April, 1891, and first tinplates in November, 1891; 3 sets; product, tinplates and terne plates; weekly capacity, 1,150 boxes. Buys black plates. Company has bought a tract of land in Philadelphia for the erection of a large tinplate works, to contain 24 sets.
- Penn Treaty Iron Works, Marshall Brothers & Co., 1156 Beach st., Philadelphia. Tinning plant added to rolling mill in 1891, and first terne plates made in October, 1891; 2 sets for tinplates and 2 sets for terne plates; weekly capacity, 1,000 boxes; enlarging the works. Make their own black plates. *See Rolling Mills.*
- Pittsburgh (The) Electro-Plating Company Limited, McClintock Building, Pittsburgh. Works at Apollo. Tinning plant built in 1890, and first terne plates made in June, 1890; 3 sets; product, terne plates; weekly capacity, 500 boxes of 246 lbs. each, 20 x 28 plates. Black plates obtained from the Apollo Sheet Iron Works. P. H. Laufman, President; James Benney, Secretary; P. H. Laufman, Jr., Manager.

Pittsburgh Tin Plate Works, P. O. Box 583, Pittsburgh. Works and office, New Kensington, on the A. V. R. R., Westmoreland county. Building; 2 stands of cold rolls, annealing oven, pickling apparatus, and 2 tinning sets in place; 2 more sets in course of erection; product to be tinplates and terne plates; estimated weekly capacity, 1,500 boxes, double turn. Buy black plates. Intend to erect a hot-rolling mill in 1892. W. P. Beaver, President; W. N. Voegtly, Secretary and Treasurer; J. B. Strawbridge, General Manager.

Scott (J. B.) & Co., 124 Second ave., Pittsburgh. Experimental plant erected in 1891-2, and first terne plates made in January, 1892. One set; product, terne plates. Contemplate adding additional sets. Buy black plates.

United Tin and Terne Plate Company Limited, Preble ave., near Hanover st., Allegheny City. One set erected and used for redipping terne plates. William Hartman, Secretary.

United States Iron and Tin Plate Works, United States Iron and Tin Plate Manufacturing Company, Demmler, Allegheny county. Original works erected in 1874; first terne plates made in 1874 and first tinplates in 1876; manufacture stopped in 1878 and resumed in 1890; 6 sets; product, tinplates and terne plates; weekly capacity, double turn, 2,000 boxes. Makes its own black plates. Enlarging the works. W. C. Cronmeyer, President; Edward Ely, 1st Vice-President; A. J. Demmler, 2d Vice-President and Manager; Charles V. McLean, Secretary; F. E. Schenck, Treasurer. *See Rolling Mills.*

MARYLAND—2 BUILDING.

Locust Point Iron and Steel Works, Coates & Co., Locust Point, Baltimore. Building a complete tinning plant; to contain 6 sets; product, tinplates and terne plates; estimated weekly capacity, 1,500 boxes. Will make their own black plates. *See Rolling Mills.*

Matthai, Ingram & Co., Baltimore. Works at Ohio ave. and Light, Winder, and Byrd sts. Erecting one set for producing tinplates. Will buy black plates.

OHIO—4, AND 3 BUILDING.

Britton (The) Rolling Mill Company, 64 Hoyt ave., Cleveland. Part of machinery in place for a complete tinplate plant, to be finished in the spring of 1892; product to be tinplates and terne plates; estimated weekly capacity, 2,500 boxes. Black plates will be supplied by its own rolling mill, built in 1890-1, to which additions are being made. J. W. Britton, President; F. W. Britton, Vice-President and General Manager; C. R. Britton, Secretary; A. M. Britton, Treasurer. *See Rolling Mills.*

Cincinnati (The) Corrugating Company, Piqua. Built in 1891, and first terne plates made August 16, 1891 one set; product, terne plates;

- weekly capacity, 250 boxes. James Hicks, President; Edward A. Hart, Treasurer; J. G. Battelle, Secretary and General Manager. Black plates obtained from the Piqua Rolling Mill Company.
- Cleveland Tin Plate Company, Cleveland. Office and works, Hoyt ave. and L. S. & M. S. Rwy. Built in 1891; first tinplates made October 31, 1891, and first terne plates December 14, 1891; 2 sets, one for tinplates and one for terne plates; weekly capacity, 500 boxes. Buys black plates. C. R. Britton, Manager.
- Columbia Tin Plate Company, Piqua, Miami county. Building; to contain 2 sets, one for tinplates and one for terne plates; estimated weekly capacity, 500 boxes. Will buy black plates. Owned by F. R. Slauson and W. K. Leonard.
- Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Tinning plant added to rolling mill in 1891; 6 sets; product, tinplates and terne plates; weekly capacity, 1,200 boxes. Make their own black plates. *See Rolling Mills.*
- Record Manufacturing Company, Conneaut, Ashtabula county. Building; to contain 5 sets; product to be tinplates; estimated weekly capacity, 2,500 boxes. Will buy black plates.
- Simpson (W. T.) & Co., 298 East Pearl st., Cincinnati. Works at Riverside, Hamilton county. Built in 1891, and first terne plates made in November, 1891; one set; product, terne plates; weekly capacity, 300 boxes of 280 lbs. each. Black plates supplied by the Cincinnati Rolling Mill Company.

INDIANA—1, AND 1 BUILDING.

- American (The) Tin Plate Company, Elwood, Madison county. Building; to contain 10 sets; product to be tin plates and terne plates; estimated weekly capacity, 2,500 boxes. Will make its own black plates. A. L. Conger, President; John F. Hazen, Vice-President; Charles S. Tarlton, Secretary; W. B. Leeds, Treasurer; E. Stanford, General Manager. *See Rolling Mills.*
- Anderson (The) Tin Plate Company, 12 East Twelfth st., Anderson, Madison county. Built in 1891; first tinplates made July 4, 1891, and first terne plates in October, 1891; one set; now making tinplates, double turn; weekly capacity, 400 boxes. Buys black plates. Adding another set, and contemplates enlarging works and erecting a hot-rolling mill for supplying black plates. C. B. Orvis, owner.

ILLINOIS—1, AND 1 BUILDING.

- Lewistown Works, Pioneer Tin Plate Company, Joliet. Began the erection in 1891 of 8 sets, 6 for tinplates and 2 for terne plates; estimated weekly capacity, 2,000 boxes. Will make its own black plates. J. Davies Lewis and N. D. Lewis, Managers. *See Rolling Mills.*

Norton Brothers, 44 River st., Chicago. Works at Maywood, Cook county. One Morewood set and one automatic experimental machine for making tinplates erected in 1891; adding additional machines. Intend making their own black plates. *See Rolling Mills.*

MISSOURI—1.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass ave. and Second st., St. Louis. Works at Second and Destrehan sts. Tinning plant added to rolling mill in 1890; first tinplates made in November, 1890, and first terne plates in March, 1891; 8 sets, 4 for tinplates and 4 for terne plates; enlarging works; when completed will have a weekly capacity of 3,600 boxes. Makes its own black plates. F. G. Niedringhaus, President; Wm. F. Niedringhaus, Vice-President; Thos. K. Niedringhaus, Secretary; Geo. W. Niedringhaus, Treasurer. *See Rolling Mills.*

UNITED STATES.

Number of tinplate works in the United States in February, 1892, in operation or prepared to make tin or terne plates: 20; number building, 10.

PROJECTED.

Falcon Iron and Nail Company, Niles, Ohio. Preparing to erect a complete tinplate plant, the black plates to be supplied by its Russia Sheet Iron Mills, built in 1864.

Kieckhefer Brothers & Co., Milwaukee, Wis. Contemplate the erection of a tinplate plant at Milwaukee.

New Castle Tin Plate Company, New Castle, Pa. Organizing to erect tinplate works on a large scale.

New Philadelphia Iron and Steel Company, New Philadelphia, Ohio. Intends to erect a plant for making tinplates, the black plates to be supplied by its own rolling mill, built in 1883.

Welsh-American Tin Plate Company contemplates the erection at Philadelphia, Pa., of a complete tinplate works of large capacity.

Several manufacturers of stamped ware in the United States have for many years tinned by old-fashioned methods some of the sheets which they needed for their own use. Some of these companies are now contemplating the erection of complete modern tinning plants.

PURE LEAD-COATED SHEETS.

Ajax (The) Lead Coating Company, 46-52 Richmond st., Philadelphia, Pa. Plant erected in 1889 for coating iron or steel sheets with pure lead; product, flat or corrugated lead-coated sheets up to 30 inches by 12 feet in size; weekly capacity, 20 to 25 tons. Buys its iron or steel sheets. J. G. Hendrickson, President; F. J. Clamer, Vice-President; J. R. Neison, Secretary and Treasurer.

CANADA.

BLAST FURNACES.

NOVA SCOTIA.

Londonderry (The) Iron Company Limited, Londonderry. Main office, Montreal. Works at Acadia Iron Mines, (near Londonderry,) Colchester county. Two stacks: Furnace A, 75 x 18, and Furnace B, 62 x 18, built in 1875-6, and blown in in 1877; Furnace A rebuilt in 1883 and again in 1891; three Siemens-Cowper fire-brick and one Ford iron-pipe stove; fuel, coke, made from coal mined in Pictou and Cumberland counties; ores, limonite, carbonate, and red hematite from Colchester and Annapolis counties; product, foundry pig iron; annual capacity, 45,000 net tons. Brand, "Siemens." A cast-iron pipe foundry is also operated in connection with the works. *See Rolling Mills.*

New Glasgow Iron, Coal, and Railway Company, Ferrona, Pictou county. Building one stack, 65 x 15½, to be completed early in 1892; three Massicks & Crooke stoves; fuel, coke, made from coal mined near furnace; ores, local brown hematite and spathic; product to be foundry pig iron, branded "Ferrona." J. F. Stairs, President; Graham Fraser, Vice-President; Harvey Graham, Secretary.

Pictou Charcoal Iron Company Limited, New Glasgow. Furnace at Bridgeville, Pictou county. Building one stack, 52 x 11; one Cooper-Durham stove; fuel to be charcoal; ore, brown hematite from East River valley; steam-power; product to be pig iron for car wheels, malleable purposes, and general foundry work; estimated annual capacity, 8,000 net tons. Wm. B. Moore, President; D. R. Grant, Treasurer; Ernst A. Sjöstedt, General Manager.

QUEBEC.

Canada (The) Iron Furnace Company Limited, Montreal. Furnace at Radnor Forges, Champlain county. One stack, 40 x 9, built and blown in in 1891; one Drummond pipe stove; steam and water power; fuel, charcoal; ores, lake and bog from the Three Rivers district and Lake a la Tortue; product, pig iron for car wheels and malleable purposes; annual capacity, 10,000 net tons. Brand, "C. I. F." P. H. Griffin, President; Robert Schott, Vice-President; George E. Drummond, Managing Director and Treasurer; Thomas J. Drummond, Secretary; John J. Drummond, Superintendent. Selling agents, Drummond, McCall & Co., Montreal. (The present stack takes the place of the old Radnor Furnace.)

John McDougall & Co., 574 William st., Montreal. Furnaces at Drummondville, Drummond county. Two stacks: Grantham Furnace, 35 x 10, built and blown in in 1880, and St. Francis Furnace, 32 x 9, built and blown in in 1881; steam and water power; fuel, charcoal; ore, local limonite; product, car-wheel pig iron. George McDougall, Manager.

ROLLING MILLS AND STEEL WORKS.

NOVA SCOTIA.

Halifax Rolling Mills Company, Halifax, Halifax county. Works on the harbor, three miles from the city. Built in 1878; 2 heating furnaces, 2 trains of rolls, and 20 cut-nail machines. Idle for some time. For sale. E. D. Adams, agent, Halifax.

Londonderry (The) Iron Company Limited, Londonderry. Main office, Montreal. Works at Acadia Iron Mines, (near Londonderry,) Colchester county. Built in 1875-6, and put in operation in 1876; 1 single and 8 double puddling furnaces, 1 scrap and 4 heating furnaces, 3 trains of rolls, (9, 16, and 18-inch,) and 3 steam hammers; product, bar iron and nail plate; annual capacity, 10,000 net tons. Brand, "Siemens." Fuel used, bituminous coal. A. T. Paterson, President; Hon. D. MacInnes, Vice-President; James Phymister, Secretary; Tom C. Paterson, Treasurer; R. G. Leckie, General Manager; A. Muir, Assistant Manager. *See Furnaces.*

Nova Scotia Steel and Forge Company Limited, New Glasgow, Pictou county. Forge built in 1872 and steel plant in 1881; 2 open-hearth steel furnaces; first steel made in 1883; 12 forge fires, 8 coal and 2 gas heating furnaces, 6 trains of rolls, (9, 16, 18, 22, and 26-inch, and a cold-rolling train,) and 7 hammers (5 upright, from 2½ cwt. to 5 tons, and 2 helve); product, railway, marine, and engine forgings, car axles, mine rails, machinery, spring, and agricultural-implement steel, and iron and steel merchant bars; annual capacity, 24,000 net tons of acid open-hearth steel ingots and 20,000 net tons of finished iron and steel products; has also made basic steel. Fuel used, bituminous coal and producer gas. Graham Fraser, President and Manager; H. Ritchie, Treasurer; Thomas Cantley, Secretary.

NEW BRUNSWICK.

Coldbrook Rolling Mills, I. & E. R. Burpee, 11 Dock st., St. John. Works at Coldbrook, St. John county. Built in 1864 and remodeled and enlarged in 1874; 1 forge fire, 7 scrap furnaces, 3 trains of rolls, (one 10 and two 18-inch,) and 2 spike machines; product, bar iron, iron and steel nail plate, ship and railway spikes, mine rails, and bridge bolts; annual capacity of rolled iron and steel, 6,000 net tons. Fuel used, bituminous and anthracite coal.

Portland Rolling Mills, J. Harris & Co., St. John, St. John county. Works built in 1856, and rolling mill added in 1860; burned and rebuilt in 1889; 1 single puddling furnace, 5 heating furnaces, 3 trains of rolls, (12 and 18-inch bar trains and an 18-inch nail-plate train,) and one 5-ton helve hammer; product, bar iron, car axles, nail plate, street and mine rails, fish-plates, knees for ships, shafting, etc.; annual capacity, 5,000 net tons. Fuel used, bituminous coal. J. C. Robertson, Managing Owner; John N. Thornton, Manager; James Mowat, Treasurer.

QUEBEC.

Metropolitan Rolling Mills, Abbott & Co., 55 St. Sulpice st., Montreal. Works on Delorimier ave. Built about 1880; equipped with heating furnaces, trains of rolls, and machinery for producing bar iron, cut nails, railroad spikes, and horse shoes.

Montreal Rolling Mills Company, Montreal. Works at Ste. Cunegonde, Hochelaga county. Built about 1857; 3 coal and 3 gas heating furnaces, 3 trains of rolls, (9-inch, 12-inch, and 18-inch,) 75 cut-nail machines, and 17 wire-nail machines; product, bar and horse-shoe iron, nail plate, skelp, horse shoes, horse-shoe nails, cut nails, and iron and steel wire nails; annual capacity, 10,000 net tons of bar and horse-shoe iron, 3,700 tons of skelp, 10,000 tons of nail plate, 25,000 kegs of horse shoes, 25,000 boxes of horse-shoe nails, 125,000 kegs of cut nails, and 20,000 kegs of wire nails. Brand, "M. R. M. Co.," inclosed in a semi-circle. Andrew Allan, President; Hugh McLennan, Vice-President; Wm. McMaster, Managing Director; Harrison Watson, Secretary and Treasurer.

Peck, Benny & Co., 391 St. Paul st., Montreal. Works on Mill st. Built about 1856; equipped with heating furnaces, trains of rolls, and machinery for producing horse nails, cut nails, and ship and railroad spikes; water-power.

Pillow and Hersey Manufacturing Company Limited, 105 Mill st., Montreal. Built in 1859; 8 heating furnaces, 4 trains of rolls, (9-inch guide, 12 and 18-inch bar, and 18-inch plate,) 91 cut-nail machines, and 12 wire-nail machines; product, cut nails, wire nails, bar iron, railway and pressed spikes, horse shoes, tacks, bolts, and nuts; annual capacity, for cut nails, 100,000 kegs; for wire nails, 12,000 kegs. Fuel used, bituminous and anthracite coal. Randolph Hersey, President; John A. Pillow, Vice-President and Managing Director; George A. Mac Agy, Secretary; George Luckhurst, Assistant Secretary.

ONTARIO.

Ontario Rolling Mill Company, Hamilton, Wentworth county. Three mills, two at Hamilton and one at Swansea, near Toronto. The Hamilton mills were built in 1861, and contain 3 double and 2 single busheling furnaces, 9 coal heating furnaces, 5 trains of rolls,

(14-inch muck, 9 and 10-inch guide, 20-inch bar, and 20-inch plate,) 3 hammers, (5-ton and 2-ton upright and one helve,) and 45 cut-nail machines; product, bar and band iron and steel, fish-plates, nail plate, forgings, cut nails, rivets, and washers; annual capacity, 100,000 kegs of cut nails and 30,000 net tons of other finished products. The Swansea mill was built in 1888, and contains one coal and 3 Smith gas heating furnaces, one 10-inch train of rolls, and one 5,000-lb. upright hammer; product, bar iron; annual capacity, 12,000 net tons. C. E. Doolittle, President; C. S. Wilcox, Vice-President and Treasurer; W. A. Child, Secretary.

Number of blast furnaces in Canada: 5 completed, and 2 building. Of these 2 use coke and 3 use charcoal as fuel, and 1 coke furnace and 1 charcoal furnace are in course of erection.

Number of rolling mills in Canada: 12. Of these 1 has an open-hearth steel plant.

MEXICO.

BLAST FURNACES.

DURANGO.

Durango Steel and Iron Company, City of Durango. Main office, Des Moines, Iowa, U. S. A. One stack, 54 x 10, built and blown in in 1887; one iron-pipe stove, with 40 pipes; steam-power; fuel, charcoal; ore, low in phosphorus, averaging 60 per cent. of metallic iron, mined near the furnace; product, foundry and mill pig iron; annual capacity, 10,000 net tons. *See Rolling Mills.*

Rosa Flores, City of Durango. Works, 6 miles from Durango. One small charcoal stack, built about 1850; water-power; product, mill and foundry pig iron; daily capacity, about 5 tons. A foundry is connected with the works. *See Rolling Mills.*

JALISCO.

Manuel L. Corcuera, Guadalajara. Furnace at Sierra de Tapalpa, district of Sayula. One stack, 40 x 9, built and blown in in 1869; cold blast; steam-power; fuel, charcoal; ore, local hematite; product, mill pig iron; annual capacity, 4,000 net tons. T. Rubalcaba, Manager. *See Rolling Mills.*

Richard Honey, San Juan de Letran, No. 12, City of Mexico. Comanja Furnaces, at Comanja, district of Lagos: two stacks, each 37 x 9; time of building uncertain; cold blast; steam-power; fuel, charcoal; ore, local brown hematite; product, gray forge pig iron; total annual capacity, 3,600 net tons, but production is much less on account of scarcity of fuel. Brand, "Comanja." *See Furnaces and Rolling Mills in Hidalgo.*

HIDALGO.

Richard Honey, San Juan de Letran, No. 12, City of Mexico. Six completed cold-blast charcoal furnaces and one stack building, all in Hidalgo: Apulco Furnace, at Apulco, one stack, 34½ x 9, built about 1835; water and steam power; ore, local brown hematite; product, gray forge pig iron. Brand, "Apulco." William Skinfill, Manager. Encarnacion and Guadalupe Furnaces, at Encarnacion and Guadalupe, two stacks, each 35 x 9; Encarnacion built about 1850 and Guadalupe in 1845; steam-power used at Encarnacion and water-power at Guadalupe; (building a new stack at Encarnacion, 35 x 9½); ore, local magnetic; product, mottled and white pig iron. Brand, "Encarnacion." Thomas Ivey, Manager. La Trinidad Furnace, at La Trinidad; post office and telegraph address, Tulancingo; one stack, 34½

x 9, built in 1850; water and steam power; ore, local brown hematite; product, gray forge pig iron. Brand, "Trinidad." John Mayne, Manager. Los Reyes Furnace, at Los Reyes; post-office and telegraph address, Tulancingo. One stack, 32 x 10 $\frac{1}{2}$, built about 1845; water-power; ore, local brown hematite; product, gray forge pig iron. Brand, "Reyes." San Miguel Furnace, at Zacualtipan, one stack, 32 x 8 $\frac{3}{4}$, built about 1859; water and steam power; ore, local brown hematite; product, gray forge pig iron. Brand, "Zacualtipan." John Skinfill, Manager. The annual capacity of these furnaces is about 2,200 net tons for Encarnacion, 2,000 tons each for Guadalupe and San Miguel, and 1,800 tons for each of the others. Selling agents, the proprietor, Valentin, Elcoro & Co., and others. *See Rolling Mills. See Furnaces in Jalisco.*

OAXACA.

La Reforma Furnace, Francisco Quijano, City of Oaxaca. Furnace at San Pedro, district of Villa Alvarez. One stack, 30 x 8, built in 1882 and blown in in 1883; cold blast; water-power; fuel, charcoal; ore, hematite, part mined near furnace and part obtained from mines 70 miles distant; product, foundry pig iron; annual capacity, 2,000 net tons. Brand, "Q." Selling agents, Quijano & Co., Oaxaca. A foundry is connected with the furnace. *See Forges.*

ROLLING MILLS AND STEEL WORKS.

CHIHUAHUA.

Compañia Industrial Mexicana, City of Chihuahua. This company has a machine shop and foundry, and has had plans made for a rolling mill to contain 1 puddling furnace, 1 heating and 1 scrap furnace, and one 10-inch train of rolls, with the object of manufacturing merchant iron from scrap. The addition of a cut-nail factory is also contemplated. Tomás Fletcher, President; Enrique C. Creel, Treasurer; Francisco Fletcher, Superintendent.

DURANGO.

Durango Steel and Iron Company, City of Durango. Main office, Des Moines, Iowa, U. S. A. Built and put in operation in 1888; 3 single puddling furnaces, 5 forge fires, 1 heating furnace, one 10-inch train of rolls, and 1 steam tilt hammer; product, bar iron; annual capacity, 2,000 net tons. Steam is employed for power, and wood is used as fuel for puddling and producer gas for heating. (The Clapp-Griffiths steel plant removed by this company from Pittsburgh, U. S. A., to Durango in 1888-9 has not yet been made use of.) James Callanan, President, Des Moines; George Crane, Vice-President, Dubuque; George W. Baker, Secretary, and A. Holland, Treasurer, Des Moines;

J. S. McCaughan, General Business Manager, Durango. Selling agents, Stahlknecht & Co., Durango. *See Furnaces.*
Rosa Flores, City of Durango. Works, 6 miles from Durango. Two puddling furnaces, one heating furnace, and one train of rolls; water-power; product, merchant bars. *See Furnaces.*

JALISCO.

Manuel L. Corcuera, Guadalajara. Works (Ferreria de Tula) at Sierra de Tapalpa, district of Sayula. Rolling mill built and put in operation in 1873; 2 single puddling furnaces, 4 forge fires, 1 heating furnace, one 9-inch and one 12-inch train of rolls, and one 1-ton upright and 2 trip hammers; product, all sizes of merchant iron; annual capacity, 2,000 net tons. Fuel used, wood. A foundry is connected with the works. *See Furnaces.*

HIDALGO.

Richard Honey, San Juan de Letran, No. 12, City of Mexico. Two completed rolling mills and an open-hearth steel plant in course of construction in Hidalgo: San Miguel works, at Zacualtipan, built about 1859; 2 single puddling furnaces, 1 heating furnace, 2 trains of rolls, and one 1-ton hammer; product, rounds and squares up to 4 inches and flats up to 6 inches in width; annual capacity, 1,800 net tons. Brand, "Zacualtipan." Building one 5-ton Siemens open-hearth steel furnace. John Skinfill, Manager. Encarnacion works, at Encarnacion, built about 1854; 3 puddling furnaces, 1 heating furnace, 2 trains of rolls, and one 22-cwt. hammer; product, same as San Miguel works; annual capacity, 2,000 net tons. Brand, "Encarnacion." Thomas Ivey, Manager. Water and steam power is employed at the San Miguel works and steam-power at the Encarnacion plant; wood is used for fuel at both works. *See Furnaces in Hidalgo and Jalisco.*

CATALAN FORGES.

NOTE.—The following forges, making wrought iron direct from the ore, are of the most primitive Catalan type, using the trompe or water blast, and having hammers of the crudest form. They use hematite and magnetic ores, are operated steadily, and consume from 200 to 250 bushels of charcoal in producing a ton of iron. The four forges here described, all in Oaxaca, are not presented as a complete list of the works of this kind now operated in Mexico; in fact there are many of the same character scattered throughout that country; but it is not feasible, nor is it necessary, to compile a complete list of them. These are given simply as an illustration of the condition of the iron industry in some parts of Mexico, where the absence of railroads makes the operation of these primitive works still profitable.

La Providencia, Francis Barriga, City of Oaxaca. Forge in the district of Villa Alvarez; 2 fires and 1 hammer; ore, hematite; product, round, square, and flat hammered bars; annual capacity, 300 net tons.

La Reforma, Francisco Quijano, City of Oaxaca. Forge in the district of Villa Alvarez; 3 fires and 1 hammer; ore, hematite; product, square and flat hammered bars from 1 inch to 4 inches in size and round hammered bars from 1 inch to 3 inches in diameter; annual capacity, 350 net tons. *See Furnaces.*

Gustavo Stein, City of Oaxaca. Two forges in the district of Tlaxiaco: San Esteben, with 3 fires and 3 hammers, and San Rafael, with 2 fires and 3 hammers. Ores, magnetic and hematite; product, round, square, and flat hammered bars; total annual capacity, 700 tons.

Number of blast furnaces in Mexico: 12 completed, and 1 building, all charcoal furnaces.

Number of rolling mills in Mexico: 5 completed, and 1 projected. In connection with these works 1 open-hearth steel plant is in course of erection and a Clapp-Griffiths steel plant is partly erected.

LATEST INFORMATION.

NOTE.—The information given below comprises changes in existing works which were made while the Directory was going through the press and descriptions of new enterprises which have since been decided upon, and makes the book complete to the middle of February, 1892.

BLAST FURNACES.

A. E. Tower is now President and Agent of the Poughkeepsie Iron Company, in place of Albert Tower, deceased. (Page 5.)

The furnaces of the Onondaga Iron Company are now leased by the Mohawk Furnace Company, of Syracuse, N. Y., which will operate them with coke as fuel, making two grades of foundry iron, "Arnold Scotch" and "Hercules." Daniel Eagan, President; Wm. Pigott, Secretary and Treasurer; W. D. Hofius, General Manager. Selling agent for part of New Jersey and New York, Gustavus C. Darlington, 206 Broadway, New York City. (Page 6.)

At the Union Iron Works the foundations for the new furnace, the stoves, and the cast house have been built, and the engine foundations are partly built, the winter weather putting a stop to further mason work until spring. (Page 6.)

Edward Kelly is now manager of Wharton Furnace, in place of Tooke Straker, deceased. (Page 9.)

The iron stoves of the Warwick Furnace are being replaced by three fire-brick stoves, each 60 x 20. (Page 16.)

No. 2 Furnace of the Stewart Iron Company Limited is being rebuilt to 75 x 16, and is to be equipped with three 70 x 18 fire-brick stoves. (Page 24.)

Shoenberger, Speer & Co. report that they are now using Lake Superior and foreign ores, are producing Bessemer pig iron only, and that the total annual capacity of their furnaces is now 120,000 net tons. (Page 26.)

The Cameron Furnace is now owned by the Sinnemahoning Iron and Coal Company, 43 Wall st., New York. (Page 27.)

E. C. Lackland, of St. Louis, is now Secretary of the Paducah Iron Company, in place of Hugh Mulholland, Jr. (Page 38.)

One of the Grand Rivers Furnaces was blown in on January 12, 1892. (Page 38.)

The Alabama Coal and Iron Company has changed its name to the Shelby Iron Company. (Page 48.)

Star and Crescent Furnace was blown in for the first time on November 26, 1891. (Page 49.)

Henry H. Adams & Co., whose office is now at 177 Broadway, New York, are agents for the American-Scotch pig iron made by Lawrence Furnace. (Page 52.)

Girard Furnace at Girard, Ohio, is being rebuilt to 80 x 18. (Page 53.)

The Andrews and Hitchcock Iron Company has been incorporated to operate the Hubbard Furnaces, under the same management as before the incorporation. (Page 54.)

R. H. Johnson, of New York City, has been appointed Vice-President and General Manager of the Columbus and Hocking Coal and Iron Company, in place of W. E. C. Coxe, resigned. (Page 55.)

A. Evans, Jr., recently Superintendent of the Detroit and Newberry furnaces, in Michigan, is now in charge of the Oswego Furnace, at Oswego, Oregon.

ROLLING MILLS AND STEEL WORKS.

George W. Cushing is now General Superintendent of the American Steel Wheel Company, in place of W. G. Richards, resigned. (Page 87.)

A syndicate represented by John Byrne, of I. B. Newcombe & Co., 54 Wall st., New York, is considering plans for reorganizing the Worcester Steel Works. (Page 89.)

The Syracuse Steel Foundry Company's works were totally destroyed by fire on January 7, 1892. They are being rebuilt and are expected to be in operation by April 1st. The company will discontinue the manufacture of crucible steel and confine its castings entirely to open-hearth steel, the open-hearth plant to consist of two 10-ton furnaces as before the fire. (Page 94.)

Heller & Brothers have one 10-inch train of rolls in their steel works. (Page 97.)

A. P. Cobb is now Treasurer of the Chestnut Hill Iron Ore Company and of the Oxford Iron and Nail Company, in place of Charles E. Sturges, deceased. (Pages 18 and 97.)

The Bates Steel Company's plant at Twenty-third and Filbert sts., Philadelphia, has been bought by the Bates Steel Supply Company, with office at the works. (Page 99.)

S. H. Chauvenet has been elected Vice-President of the Wellman Iron and Steel Company, in place of Wm. G. Neilson, resigned. (Page 111.)

A company to be called the Penn Steel Casting and Machine Company is being organized to manufacture steel castings at Chester, Pa.

The Hollidaysburg and Gap Iron Works are now owned by the first mortgage bondholders, represented by Aug. S. Landis, attorney. (Pages 21 and 114.)

F. P. Kaercher has been appointed General Manager of the Montour Iron and Steel Company as well as Secretary. (Page 117.)

- Charles S. Price is now General Manager of the Cambria Iron Company, in place of John Fulton, who takes charge of the company's mining properties. (Page 135.)
- H. H. Niemann is now President of the Canonsburg Iron and Steel Company, in place of C. Meyran, deceased; and H. S. Duncan is Vice-President as well as Business Manager. (Page 136.)
- The New Castle Steel Casting Company, of New Castle, Pa., connected with the Keystone Plow Company Limited, built in 1891 a crucible steel plant with a capacity of 22 pots at each heat; product, steel for general castings. D. F. Balph, Manager.
- A rolling mill for rolling black plates for tinning is projected by Messrs. Blackshaw, Boycott, and Bayliss at Hammondsville, Fayette county, Pa. Post-office at Stauffer, Westmoreland county.
- The Diamond State Iron Company reports that its Diamond State Mill now contains 2 single and 8 double puddling furnaces and 4 heating furnaces, and that its Old Ferry Mill contains 2 single and 10 double puddling furnaces and 8 heating furnaces. The company also has offices at 8 Oliver st., Boston, Mass.; 64 South Canal st., Chicago, Ill.; 211 Park ave., Baltimore, Md.; and 20 Ainsworth Block, Portland, Oregon. (Page 140.)
- William C. Lane was on February 11, 1892, appointed by the courts Receiver of the United States Rolling Stock Company, in place of A. Hegewisch, resigned. (Pages, 152, 242, 249, and 250.)
- The Mahoning Iron Works of Brown Bonnell & Co., at Youngstown, Ohio, now contain 26 single and 39 double puddling furnaces. (Page 157.)
- The Atkinson Steel and Spring Works have been using coal gas as fuel, but are changing to oil. G. Baumann is Secretary of the works. (Page 169.)
- The Corning Steel Company, a company organized under the laws of Illinois, with an office at Rooms 418-420 Phoenix Building, Chicago, has decided to erect a rolling mill at Hammond, Ind., to be completed in the summer of 1892. The mill will contain 4 trains of rolls and one 2-ton hammer; product to be steel sheets and light plates. A 20-ton basic open-hearth steel furnace is also to be erected. Petroleum will be used as fuel. Franklin T. Corning, President; Charles S. Corning, Secretary and Treasurer.
- The Illinois Bolt and Nut Company, which bought the unfinished Peoria Rolling Mill, states that it has not yet organized a company to operate the mill, which will soon be completed. It has been decided, however, to call the company when organized The Peoria Steel and Iron Company. The product of the mill will be merchant iron, steel hoops, and the "Champion" nut-lock track bolt. The President of the Illinois Bolt and Nut Company is G. J. Gibson; Secretary and Treasurer, B. J. Greenhut. (Page 172.)

The first blow in the Bessemer steel plant of the West Superior Iron and Steel Company was made on January 27, 1892. (Page 176.)
W. D. Hofius has purchased the Trinidad Rolling Mill. (Page 179.)
The Pacific Rolling Mill Company states that its open-hearth steel plant now consists of one 5-ton and two 12-ton furnaces. (Page 180.)

DIRECT PROCESS PLANTS.

The Harriman Wrought Iron Company, which erected an experimental furnace at Harriman, Tenn., in 1891 for testing the Neville direct process, proposes to erect a plant of 12 direct process furnaces at that place. Officers of this company have also tested the process at Rockaway, N. J., and formed the New Jersey Wrought Iron Company, with the intention of building a number of furnaces in New Jersey, probably at Rockaway, in connection with rolls and machinery for manufacturing railroad material. The officers of the Harriman Wrought Iron Company are: E. K. Seguire, President; A. A. Hopkins, Vice-President; P. W. Levering, Secretary and Treasurer. The officers of the New Jersey Wrought Iron Company are: E. K. Seguire, President; P. W. Levering, Treasurer; S. H. Jacobs, Secretary; Wm. H. Axford, Mechanical Director. Office of both companies at 76 Montgomery st., Jersey City, N. J.

MISCELLANEOUS WORKS.

The Chicago Wire and Spring Company reports that it is not now operating works at Lockport, Ill. (Page 228.)
The Joliet Enterprise Company, of Joliet, Ill., has completed and put in operation its extensive Rockdale wire-drawing plant at Joliet. The company is also preparing to make barb wire, wire nails, wire netting, etc.
The McCosh Iron and Steel Company, of Burlington, Iowa, has failed. John H. Gear, Receiver for the creditors, is selling the stock of material on hand. (Pages 225 and 229.)

INDEX TO NAMES OF WORKS.

NOTE.—This index includes all the blast furnaces, rolling mills, steel works, forges, bloomaries, and tinplate works which are named in this Directory.

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