
THE
IRON AND STEEL WORKS
OF THE
UNITED STATES

1888

Class 669.3 Book A51



Presented by
Mr W C Clapp.



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

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

PREPARED AND PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

CORRECTED TO NOVEMBER, 1887.

PHILADELPHIA.

PUBLISHED AT No. 261 SOUTH FOURTH STREET.

1888.

2 669.102
A51

Entered, according to act of Congress, in the year 1887,
BY THE AMERICAN IRON AND STEEL ASSOCIATION,
In the office of the Librarian of Congress, at Washington.

r TS301.A6
1888

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

Printed by
ALLEN, LANE & SCOTT,
Nos. 229-231-233 South Fifth Street,
Philadelphia.

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PREFACE.

THE present edition of the Directory of the American Iron and Steel Association to the Iron and Steel Works of the United States is the ninth which has been issued. It will be found upon examination to be the most complete of the series. Its immediate predecessor was published in August, 1886. The first attempt by the Association in the compilation of a Directory was completed in November, 1873, and was embodied in a thin pamphlet of 45 pages. The first regular and complete edition was, however, issued in September, 1874. It contained 114 pages, and satisfactorily showed the extent and characteristics of our iron and steel industries at that time. The present edition contains 243 pages. In its preparation the style and method which have uniformly characterized its predecessors have been closely followed. Our rule has always been to exclude unnecessary verbiage, and thus keep the Directory within reasonable bounds. The contents of the present edition are arranged in the same alphabetical order as the contents of previous editions, and a new index, supplementary to the one heretofore given, will readily assist the reader to find all companies, firms, and individuals operating the works named in those chapters of the book which describe blast furnaces, rolling mills, steel works, forges, and bloomaries.

The present volume contains a complete list of the blast furnaces, rolling mills, Bessemer steel works, open-hearth steel works, crucible steel works, Clapp-Griffiths steel works, forges, bloomaries, cut-nail works, wire-rod and wire mills, wire-nail works, car works, car-axle works, car-wheel works, locomotive works, and cast and wrought iron pipe works in the United States—the whole corrected to November, 1887. The Directory is, however, dated January 1, 1888, being intended for that year.

In the descriptions of the various works found in this Directory the names of establishments are given first, whenever they have distinctive names, followed by the names of owners or lessees and their post-office addresses. Where the kind of power is not mentioned steam-power will be understood. In the list of blast furnaces the size of each furnace stack is indicated by two numbers connected by the character "x," the first and larger number being the height of the stack in feet, and the last and smaller number being its diameter in feet at the bosh. Where the kind of top is not stated a closed top will be understood, as most furnaces now have closed tops. For the sake of brevity iron hot-blast stoves are generally omitted in the description of furnace plants; only fire-brick stoves are specially mentioned. References to other iron works owned or leased by the same parties are made in italics. The names of officers of incorporated companies operating both blast furnaces and

rolling mills are printed only in connection with the description of rolling mills. The Association is not responsible for statements of the kind of product made and the capacity of the works mentioned.

In the Directory for 1886 we enumerated 578 furnaces as being entitled to be classed in the active list, while in the present revision 582 furnaces appear in this list, a gain in fifteen months of only four furnaces, notwithstanding the great activity in that time in the building of furnaces in the Southern States. This small increase in the total number of furnaces is due to the fact that a number of furnaces in various parts of the country have lately been abandoned or have long been idle, so that we have placed them in the inactive list. The number so dealt with is 20, while the number of furnaces which have been completed since our last Directory appeared is 24, showing a net gain of 4 in the total list of furnaces. Among the furnaces which we now retire to the abandoned list is old Oxford Furnace, at Oxford, New Jersey, which was built in 1742. Notwithstanding the great activity that has taken place in the building of new furnace plants in the South since the appearance of our Directory for 1886 only 7 furnaces have been added to our active list in that section—2 in Virginia, 3 in Alabama, and one in each of the States of Kentucky and Tennessee. The year 1887 has been exceptionally active in the building of new furnaces, many of which will be completed in the early part of next year. Thirty furnaces are now under construction, and of these 19 are being built in Alabama, (17 to use coke and 2 to use charcoal,) 3 in Tennessee, 2 in Maryland, 2 in Ohio, and one in each of the States of Pennsylvania, Virginia, Michigan, and Wisconsin.

The annual capacity of the 578 furnaces in August, 1886, was given as 9,960,700 net tons, an average of 17,233 tons each. In November, 1887, the annual capacity of the 582 furnaces is placed at 10,990,993 net tons, or an average of 18,885 tons each. These figures of capacity are obtained from the returns of individual establishments, and represent the maximum productive capacity of all the furnaces if it were possible for them all to be in blast at the same time and under the most favorable circumstances. As these conditions are absolutely impossible the figures of total capacity must be accepted with reserve, and as an aggregate for the correctness of which we do not hold ourselves responsible. They are entirely too high.

In August, 1886, there were 423 completed rolling mills and steel works in the United States, with 13 building; and in November, 1887, there were 433, with 12 building. The whole number of puddling furnaces was nearly the same in both years, being 4,888 in 1886 and 4,882 in 1887. The heating furnaces numbered 2,563 in 1886, and 2,686 in 1887. The number of trains of rolls has increased from 1,475 in 1886 to 1,486 in 1887. The annual capacity of the rolling mills has shown an increase since the publication of our last Directory. In August, 1886,

the annual capacity of the rolling mills in finished iron and steel was reported to us to be 7,613,000 net tons, and in November, 1887, it was 8,265,000 tons. In August, 1886, there were 83 rolling mills which contained 6,355 nail machines, devoted to the manufacture of cut nails and spikes. In November, 1887, the number of rolling mills manufacturing cut nails was 81, with 6,350 nail machines.

The Directory shows that in November, 1887, there were 96 rolling mills and steel works in this country which wholly or in part used natural gas for fuel. In August, 1886, we enumerated 68 rolling mills and steel works which used natural gas, and in September, 1884, this fuel was used in only six establishments. Of the total number now using this fuel 57 are located in Pittsburgh and Allegheny county, Pa., 15 are in the western district of Pennsylvania outside of Allegheny county, 7 are in Wheeling or its vicinity in West Virginia, and 17 are in Ohio. The territory in which are located the iron and steel works which use natural gas for fuel extends as far east as Johnstown, Pennsylvania, 79 miles east of Pittsburgh. In Ohio natural gas is used in the mills at Youngstown in the northeastern section of the State, piped from wells in Pennsylvania, and at Findlay and Bowling Green in the northwestern section of the State, obtained from local wells. In the intervening country between Youngstown and Findlay, which contains many large iron and steel works, including those at Cleveland, natural gas is not used. At Steubenville, Bridgeport, Bellaire, Martin's Ferry, and a few neighboring places on the Ohio side of the Ohio river, natural gas, piped from wells in Pennsylvania, is used in iron and steel works. Natural gas has been found at a few points in the central and eastern parts of Indiana, but the supply is so small that no rolling mill or steel works in that State is using this fuel.

When the last edition of our Directory was printed, in August, 1886, there were in the country 27 standard Bessemer steel works, (not including Clapp-Griffiths plants,) with 58 converters, and 7 new plants were in course of erection. In November, 1887, when our present edition was completed, there were 35 standard Bessemer steel works, with 74 converters, and 3 new plants were being built. The increase in the number of new Bessemer steel works from September, 1884, when our Directory for 1884 appeared, to August, 1886, the date of publication of our last Directory, a period of nearly two years, was 7 works, with 13 converters; whereas the increase from August, 1886, to November, 1887, to which date our present edition has been corrected, a period of fifteen months, was 8 works, with 16 converters. The increase which has taken place during the past few years in the erection of standard Bessemer steel plants has been chiefly in the addition to existing iron rolling-mill plants of small converters for the production of steel for nail-plate, wire-billets, and for structural, machinery, and many miscellaneous purposes. Only three of the Bessemer works which have been completed since

our last Directory was printed will roll part of their product into rails. The annual ingot capacity of the completed and building Bessemer works increased from 4,102,000 net tons in 1886 to 4,750,000 tons in 1887.

The Clapp-Griffiths steel industry has not exhibited much progress since 1886. In 1884 only one works in this country was using the Clapp-Griffiths process. In August, 1886, this number had increased to 6 completed works and 2 building, containing in all 13 converters. In November, 1887, there were 8 completed works, with 15 converters, and one converter, which had been removed from Port Henry, New York, was being re-erected at Pittsburgh. The completed and building works have 16 converters, and the annual ingot capacity of these works is 225,000 net tons. The completed and building plants in August, 1886, had an annual ingot capacity of 200,000 net tons. The fact that only three standard Bessemer steel plants are now being built, and that no new Clapp-Griffiths plants are being erected, will not escape attention.

Our open-hearth steel industry still continues to show great progress from year to year in the building of new plants. In August, 1886, there were 42 completed open-hearth steel works in the United States and 7 in course of erection. In November, 1887, there were 50 completed works and 3 in course of erection. The open-hearth steel works in 1886 completed and building contained 89 furnaces, and in 1887 they contained 104 furnaces. In 1886 the annual ingot capacity of the works completed and then building was 660,000 net tons, and in 1887 it was 815,000 tons.

At the date of the publication of our Directory for 1886 there were in this country 40 works producing steel by the crucible process, containing 3,391 steel-melting pots. In November, 1887, there were 41 completed crucible steel works, containing 3,398 pots, and one crucible steel plant was being built to contain 20 pots.

The number of forges which are prepared to make wrought iron direct from the ore has decreased from 50 in 1886 to 38 in 1887, New York having lost 5, Tennessee 2, and North Carolina 5. In 1886 there were 42 bloomaries prepared to make blooms from scrap iron and pig iron, and in 1887 there were 37. In 1886 the annual capacity of the iron-ore forges was 70,000 net tons, and in 1887 it was 63,000 tons. In 1886 the annual capacity of the bloomaries was 65,000 net tons, and in 1887 it was 54,000 tons. Most of the forges and bloomaries are now idle. Within the past few years many forges and bloomaries have been abandoned. Modern processes and these primitive methods run an unequal race.

The number of miscellaneous works enumerated in this Directory is as follows: wire-nail mills, 47; wire-rod and wire mills, 57; car-wheel works, 114; car-axle works, 70; carbuilding works, 92; locomotive works, 25; wrought-iron pipe works, 29; cast-iron pipe works, 30. The list of these miscellaneous works is very complete and very valuable.

Twenty-five States and one Territory (Washington) now manufacture pig iron; iron and steel rolling mills are found in 28 States and one Territory (Wyoming); cut nails are made in 15 States; Bessemer steel is made in 11 States; Clapp-Griffiths steel in 3 States; open-hearth steel in 11 States; crucible steel in 11 States; and there are iron-ore forges and pig-and-scrap bloomeries in 13 States.

Since we issued the first edition of this Directory, nearly fifteen years ago, many changes have taken place in the metallurgical characteristics and in the territorial distribution of our iron and steel industries, and these it would be interesting to note in detail if time and space permitted. One of the most important changes that has taken place is the wonderful development of our Bessemer steel industry; another is the almost complete substitution of steel rails for iron rails and the practical abandonment of the manufacture of the latter. Steel-headed rails and Nes Silicon rails have entirely disappeared from the pages of the Directory. Our open-hearth steel industry is practically the creation of the last few years. Another great change has been wrought in the wide substitution of bituminous coke for anthracite coal and charcoal in the manufacture of pig iron. Still another great change is the introduction of natural gas as fuel in nearly a hundred rolling mills and steel works. The advent of the steel cut nail and of the steel wire nail within the past few years is also worthy of mention.

The changes which have taken place in the territorial distribution of our iron and steel industries chiefly affect New England and the Southern States of Tennessee and Alabama. There has been a noticeable decline in the manufacture of rolled iron in New England, chiefly in Massachusetts, in which State five iron rolling mills have been abandoned since the appearance of our last Directory, namely, Fall River, Gosnold, Parker, Somerset, and Weymouth. The Pembroke works in Maine were abandoned in 1884 and the St. Albans works in Vermont in 1885. The Birmingham works in Connecticut were abandoned in 1887. There is observable, however, a tendency to engage in the manufacture of steel in New England, several steel works having been erected in Massachusetts alone in recent years. In Tennessee and Alabama there has been in the last few years great and even phenomenal activity in the erection of furnaces to use coke as fuel. There were scarcely half a dozen coke furnaces in these States when our first Directory was issued in 1873; now there are 23 coke furnaces completed and 18 are in course of erection. Most of these furnaces are large and equipped with all modern improvements. The immediate future of the coke pig-iron industry in these two States will be watched with a great deal of interest.

On the two pages which follow we present tabulated summaries of the leading facts presented in the present Directory. J. M. S.

GRAND SUMMARY.

IRON AND STEEL WORKS.	November, 1887.	August, 1886.
Number of completed Blast Furnaces,—214 Bituminous, 200 Anthracite and Coke, and 168 Charcoal; total,	582	578
Number of Blast Furnaces building in November, 1887,—21 Bituminous, 2 Anthracite, and 7 Charcoal; total,	30	19
Annual capacity of completed Blast Furnaces, in pig iron, net tons,	10,990,993	9,960,700
Annual capacity of the Bituminous Furnaces, net tons,	6,442,700	5,709,500
Annual capacity of the Anthracite Furnaces, net tons,	3,391,493	3,106,200
Annual capacity of the Charcoal Furnaces, net tons,	1,156,800	1,145,000
Number of completed Rolling Mills and Steel Works,	433	423
Number of Rolling Mills and Steel Works building,	12	13
Number of Single Puddling Furnaces, (a double furnace counting as two single ones,)	4,882	4,888
Number of Heating Furnaces,	2,686	2,563
Number of Trains of Rolls,	1,486	1,475
Annual capacity of Rolling Mills in finished iron and steel, net tons,	8,265,000	7,613,000
Number of Rolling Mills having Nail Factories,	81	83
Number of Nail Machines,	6,350	6,355
Number of Nail Factories building,	1	2
Number of Nail Machines to be used in the new Factories,	60	175
Number of completed Bessemer Steel Works,	35	27
Number of Bessemer Steel Works building,	3	7
Number of Bessemer Converters in November, 1887,—74 completed and 5 building,	74	58
Annual capacity in ingots, net tons,	4,750,000	4,102,000
Number of completed Clapp-Griffiths Steel Works,	8	6
Number of Clapp-Griffiths Steel Works building,	1	2
Number of Clapp-Griffiths Converters in November, 1887,—15 completed and 1 building,	15	10
Annual capacity in ingots, net tons,	225,000	200,000
Number of completed Open-Hearth Steel Works,	50	42
Number of Open-Hearth Steel Works building,	3	7
Number of Open-Hearth Furnaces in November, 1887,—94 completed, 10 building, and 2 standing nearly completed,	94	71
Annual capacity in ingots, net tons,	815,000	660,000
Number of completed Crucible Steel Works,	41	40
Number of Crucible Steel Works building,	1	..
Number of Steel-melting Pots,	3,398	3,391
Annual capacity in ingots, net tons,	112,000	110,000
Number of completed Forges making wrought iron from ore,	38	50
Annual capacity in blooms and billets, net tons,	63,000	70,000
Number of completed Bloomaries making blooms from pig and scrap iron,	37	42
Annual capacity in blooms, net tons,	54,000	65,000

SUMMARY BY STATES.

STATES AND TERRITORIES.	Furnaces.		Iron and Steel Rolling Mills.*	Nail Ma- chines.	Steel Works.				Forges and Bloom- aries.
	Completed.	Building.			Bessemer.	Clapp-Griffiths.	Open-hearth.	Crucible.	
Maine,	1		1						1
New Hampshire, . .			1				1		
Vermont,									1
Massachusetts, . . .	4		19	413	1	1	4	1	
Rhode Island,			1						
Connecticut,	9		8					3	1
New York,	40		22		1		1	5	22
New Jersey,	18		18	327			1	5	10
Pennsylvania,	242	1	189	1,949	13	6	27	21	21
Delaware,			10						
Maryland,	18	2	6					1	2
Virginia,	33	1	4	146	1				3
North Carolina, . . .	2								3
Georgia,	4								
Alabama,	24	19	4	82					1
Texas,	2		1						
West Virginia,	9		8	822	2				
Kentucky,	7		7	126			1		
Tennessee,	17	3	5	115	2		1	1	8
Ohio,	76	2	55	1,301	6		9	1	1
Indiana,	2		12	340	1		2	1	
Illinois,	16		22	474	6	1	2	1	
Missouri,	12		5		1				1
Iowa,			1						
Michigan,	26	1	3					1	
Wisconsin,	14	1	1	100					
Minnesota,	1		2						
Kansas,			1						
Nebraska,			1	32					
Colorado,	2		2	27	1				
Wyoming Territory, . .			1						
California,	1		4	96			1		
Oregon,	1								
Washington Territ'ry	1								
Total,	582	30	414	6,350	35	8	50	41	75

Number of rolling mills building, 10. Number of steel plants building, 8 (3 Bessemer, 1 Clapp-Griffiths, 3 open-hearth, and 1 crucible.)

* Excludes all steel works that produce neither rolled iron nor rolled steel.

THE IRON AND STEEL WORKS

OF

THE UNITED STATES.

BLAST FURNACES.

NOTE.—A list of furnaces which have been abandoned or which are likely to remain inactive for some time will be found separately printed after the following list. The telegraph address is given only when it is not the same as the post-office address.

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; annual capacity, 6,000 net tons. Specialty, car-wheel pig iron. Brand, "Katahdin." Charles A. Lord, President; H. McLaughlin, Treasurer; O. W. Davis, Jr., General Manager.

Number of furnaces in Maine: one charcoal stack.

MASSACHUSETTS.

CHARCOAL.

Lanesborough Furnace, John L. Colby, 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; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron.

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, 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; ore, brown hematite, from mines owned by the works; total annual capacity, 10,000 net tons of foundry pig iron for cannon, car-wheels, and

machinery. Brand, "Richmond." Main office at Richmond Furnace. William H. Barnum, President and General Manager, Lime Rock, Conn.; George Church, Treasurer, Great Barrington, Mass.
Number of furnaces in Massachusetts: 4 charcoal stacks.

CONNECTICUT.

CHARCOAL.

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

Chapinville Furnace, Chapinville, Litchfield county. One stack, 40 x 9; built in 1825, burned in 1879, and rebuilt in 1881; hot blast; open top; water-power; annual capacity, 3,500 net tons. Owned by Mrs. Cornelia Landon.

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. William H. Barnum, President, Lime Rock; James A. Bierce, Treasurer and Secretary.

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

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

Lime Rock Iron Company, Lime Rock, Litchfield county. Established in 1734; first incorporated in 1828; incorporated by the present company in 1863; present furnace, one stack, 32 x 9, built in 1864; warm blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable purposes; annual capacity,

4,000 net tons. Samuel S. Robbins, President; William H. Barnum, Treasurer; Milo B. Richardson, Secretary and Assistant 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, 3,500 net tons. William H. Barnum, President; Charles W. Barnum, Treasurer; Milo B. Richardson, Secretary.
 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 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; total annual capacity, 38,000 net tons. *See Rolling Mills.*
- Cedar Point Furnace, Witherbees, Sherman & Co., Port Henry, Essex county. Branch sales office, 40 Wall st., New York. One stack, 71 x 15, built in 1872-3, 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, 306 Powers' Block, Rochester, Monroe county. Furnace at Charlotte, 7 miles from Rochester, at the mouth of the Genesee river. One stack, 65 x 15, built in 1868, and rebuilt in 1884; fuel, anthracite coal and coke; ore, local hematite; annual capacity, 20,000 net tons. Specialty, foundry pig iron. Brand, "Charlotte." George B. Smith, President; A. S. Clarke, Secretary and Treasurer; William John Pollock, Superintendent.
- Cold Spring Furnace, West Point Furnace Company, Cold Spring, Putnam county. One stack, 60 x 15½, built in 1863; ores, Hudson river roasted carbonate and New York magnetic; product, neutral forge and foundry and Bessemer pig iron; annual capacity, 17,000 net tons. Brand, "West Point." Joseph C. Kent, President, Phillipsburg, N. J.; J. Wesley Pullman, Secretary and Treasurer, 240 South Third st., Philadelphia. Selling agents, Crocker Brothers, 32 Cliff st., New York.
- Crown Point Furnaces, Crown Point Iron Company, Crown Point, Essex county. Two stacks, situated on the bank of Lake Champlain, 60 x 17 and 70 x 18, built in 1872-3, and the second stack rebuilt in 1881; six

- Siemens-Cowper-Cochrane fire-brick stoves, three 15 x 45 and three 16 x 60; fuel, anthracite coal and coke; product, Bessemer pig iron, produced from Crown Point (or Penfield) and Chateaugay ores; total annual capacity, 45,000 net tons. Brand, "Crown Point." LeGrand B. Cannon, President, and H. M. Olmsted; Secretary and Treasurer, 21 Cortlandt st., New York. Officers at the works: A. L. Inman, General Manager; H. L. Reed, Cashier and Assistant General Manager; W. S. Green, Superintendent of furnaces. Selling agent, F. J. Dominick, 21 Cortlandt st., New York. *See Forges.*
- Dutchess Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 50 x 12, built in 1873 for charcoal and enlarged and changed to anthracite in 1877; open top, with "hat;" fuel, anthracite coal and coke; annual capacity, 8,400 net tons. Not in blast since June, 1882. Offered for sale by the executors of the Estate of James Brown. John S. Schultze, President and Treasurer, 59 Wall st., New York. *See Clove Spring (charcoal) Furnace.*
- Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Two stacks, each 57 x 16, built in 1872, first blown in October 5, 1872; fuel, anthracite coal and coke; ores, hematite from Jefferson county, N. Y., and Centre county, Pa., and magnetic from Lake Superior and Canada; product used principally at the mills of the company for bar iron, angles, and plates; total annual capacity, 36,000 net tons. *See Rolling Mills.*
- Fallkill 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; total annual capacity, 30,000 net tons. H. M. Braem, Secretary, New York. Selling agents, Edward Bech & Co., 69 Wall st., New York.
- Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. One stack, No. 2, 70 x 14, built in 1871, and remodeled in 1883, three fire-brick hot-blast stoves having been added; fuel, anthracite coal and coke; ore, local fossil; product, pig iron for stove plates and small castings; annual capacity, 36,000 net tons. Furnace No. 1, built in 1870, torn down in 1887, with a view of replacing it with a larger stack. E. L. Hedstrom, President, Buffalo; E. F. Holden, Treasurer, Syracuse; C. H. Smyth, Secretary and Superintendent, at the works.
- Hudson Iron Works, Hudson Iron Company, Hudson, Columbia county. Two stacks, each 49 x 15, built in 1851; ores, hematite from West Stockbridge, Mass., and Lake Champlain magnetic; product, principally best quality of foundry iron, though it is also used for best grades of bar iron; total annual capacity, 26,000 net tons. Brand, "Hudson." J. W. Hoysradt, President and General Agent; S. Seymour, Secretary and Treasurer.

- Kirkland Furnace, Kirkland Iron Company, Kirkland, Oneida county. Telegraph address, Utica. One stack, 65 x 14, built in 1873, reconstructed in 1882, and changed from water to steam power; fuel, anthracite coal and coke; ores, local and Northern New York hematite or fossiliferous and Lake Champlain and Canadian magnetic; annual capacity, 18,000 net tons. Specialty, foundry pig iron. Brand, "Kirkland." Theodore W. Dwight, President; I. A. Williams, General Manager and Treasurer, Utica, N. Y.
- Manhattan Iron Works, Manhattan Iron Works Company, Manhattanville, New York City. Two stacks, 49 x 12½ and 49 x 13, built in 1851 and 1857; fuel, anthracite coal; ores, magnetic from Lake Champlain and hematite from Sharon, on the New York and Harlem Railroad; product, neutral pig iron, suitable for foundry or mill purposes; total annual capacity, 18,000 net tons. R. H. Hoadley, President; William W. Van Voorhis, Vice-President and Treasurer; Charles Brock, Secretary and Manager; M. Harris, Superintendent.
- Onondaga Iron Company, Granger Block, corner East Water and Grape sts., Syracuse. Works at Geddes, Onondaga county. Two stacks, each 65 x 15½; No. 1 built in 1869-70, blown in June 17, 1870; No. 2 built in 1872, blown in November 14, 1872; fuel, Connellsville coke and anthracite coal; ores, from Ontario, Clinton, and Jefferson counties, New York; product known as "Onondaga" pig iron; total annual capacity, 36,000 net tons. Foundry and mill pig iron are produced; quality nearly neutral, cold-short tendency, well adapted for boiler plate, hoops, and bands. James J. Belden, President; A. J. Belden, Secretary and Treasurer; A. C. Belden and P. Lynch, Managers.
- Peekskill Furnace, Empire State Iron Company, 121 Liberty st., New York. Furnace at 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." Croft Mine, Putnam county, and Croft Mine Railroad form part of this property.
- Port Henry Furnaces, Port Henry Furnace Company, Port Henry, Essex county. Two stacks, situated on the bank of Lake Champlain, each 66 x 16, built in 1853 and 1861, rebuilt in 1868, 1871, and 1887; ores, Lake Champlain; product, forge and foundry pig iron; total annual capacity, 40,000 net tons. Brand, "Port Henry." S. H. Witherbee, President; G. R. Sherman, Vice-President; H. B. Willard, Treasurer.
- Sterling Iron and Railway Company, 45 William st., New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 13, built as a charcoal furnace in 1806, converted to anthracite in 1868; and Sterling, 42 x 14, built as a charcoal furnace in 1848, converted to anthracite in 1866; ore, magnetic, mined on the company's property near the furnaces; product, foundry and mill pig iron; total annual capacity, 15,000 net tons. Iron called "Sterling." A. W. Humphreys, President.

Troy Steel and Iron Company, Troy, Rensselaer county. Three stacks, each 80 x 18, built in 1886-7; 12 Whitwell fire-brick stoves; fuel, anthracite coal and coke; ores, magnetic from Franklin county and carbonate from Columbia county; 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: 30 stacks.

CHARCOAL.

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, rebuilt in 1885; Standish Furnace, at Standish, 60 x 10½, first blown in in February, 1887; hot blast; ore, Chateaugay magnetic; product, charcoal pig iron for car-wheels and malleable purposes; total annual capacity, 20,000 net tons. Brand, "Chateaugay." Andrew Williams, President, M. F. Parkhurst, Cashier, and A. L. Inman, General Manager, Plattsburgh; H. M. Olmsted, Treasurer, and F. J. Dominick, general sales agent, 21 Cortlandt st., New York. *See Forges.*

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

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

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

Gere Iron and Mining Company, Port Leyden, Lewis county. 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; ores, Jefferson county, Old Sterling, Salisbury, and Canadian; Davis & Colby ore roaster; product, car-

wheel pig iron, chill graded; total annual capacity, 18,000 net tons. Brand, "Gere." The company has erected works for the distillation of wood, producing charcoal and converting pyroligneous acid into commercial products. Jacob Crouse, President; W. H. H. Gere, Vice-President; and R. A. Bonta, Secretary and Treasurer, all at Syracuse, N. Y.

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; hot blast; ore, Salisbury; annual capacity, 12,000 net tons. Specialty, car-wheel pig iron. Brand, "Salisbury." William H. Barnum, President; George S. Frink, Secretary and Treasurer.

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

Wassaic Furnace, 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. Brand, "Wassaic." Also produce a special iron with unusual tensile strength from carbonate ore. Brand, "Carbonate." Annual capacity, 4,000 net tons. Idle. The furnace property is for sale.

Number of charcoal furnaces in New York: 10 stacks. Total number of furnaces in New York: 40 stacks.

NEW JERSEY.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. Three stacks, one 75 x 18, one 75 x 17, and one 60 x 18, built in 1848; remodeled since that date; ore, magnetic, from the company's mines; product, all grades of pig iron, with special qualities for plates, sheets, wire, nails, and car-wheel chill; total annual capacity, 50,000 net tons. Brand, "Andover." Philadelphia office, 240 South Third st. John R. Fell, President; Charles Gilpin, Jr., Treasurer. Superintendent of works, Joseph C. Kent, Phillipsburg.

Boonton Furnaces, Eckert & Brother, lessees, Reading, Pa. Furnaces at Boonton, Morris county. Two stacks, 70 x 14 and 60 x 16, built in 1848 and 1868, respectively, and remodeled in 1886; steam and water power; total annual capacity, 33,000 net tons. Furnaces owned by the Estate of J. Couper Lord, 68 Wall st., New York. See *Henry Clay Furnaces, Schuylkill Valley, Pennsylvania.*

Chester Furnace, W. J. Taylor & Co., lessees, Chester, Morris county.

One stack, 60 x 13, built in 1878 to make spiegeleisen from zinc residuum, and rebuilt in 1880 to make pig iron; fuel, anthracite coal and coke; product, extra red-short mill pig iron, made from Chester ores, roasted in the Taylor gas kiln; annual capacity, 16,500 net tons. Brand, "Jersey." Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia, and John W. Quincy & Co., 98 William st., New York.

Franklin Iron Company, Franklin Furnace P. O., Sussex county. One stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; 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, Franklin Furnace, N. J.

Musconetcong Furnaces, Musconetcong Iron Works, Stanhope, Sussex county. Two stacks, 70 x 16½ and 80 x 20, built in 1841 and 1843, and rebuilt in 1866 and 1869; fuel, anthracite coal and coke; ore, magnetic, mined in Morris and Sussex counties; total annual capacity, 56,000 net tons. Specialty, No. 2 foundry and gray forge pig iron. Brand, "M. I. W." A. Pardee, President, Hazleton, Pa.; H. H. Wilson, Secretary and Treasurer, 237 South Third st., Philadelphia; I. P. Pardee, Superintendent, Stanhope, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York.

New Jersey Zinc and Iron Company, Newark, Essex county. Sales office, 61 Maiden Lane, New York. Two stacks: A, 31 x 8, built in 1885, to take the place of two stacks built in 1855 and 1863; and B, 30 x 8, built in 1883 to take the place of the stack built in 1871; fuel, anthracite coal; product, spiegeleisen, from zinc residuum; combined annual capacity, 7,500 net tons. B. G. Clarke, President, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. P. Hardenburgh, Manager, Newark.

Oxford Iron Works, Oxford Iron and Nail Company, Oxford, Warren county. Main office, 52 Wall st., New York. One stack, 63 x 17, built in 1871; fuel, anthracite coal; ore, magnetic, mined near the works; product, mill pig iron; annual capacity, 16,000 net tons. (Another stack, 36 x 10, built in 1742, is out of blast and not likely to be put in again.) 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 E. Maxwell, Secretary and Treasu-

rer; Aaron Clark, Superintendent. Selling agents, Manning & Squier, 111 Liberty st., New York.

Pequest Furnace, Cooper & Hewitt, Oxford, Warren county. One stack, $67\frac{1}{2} \times 16\frac{1}{2}$, built in 1874, and rebuilt in 1883; fuel, $\frac{1}{4}$ anthracite coal and $\frac{1}{2}$ Connellsville coke; ores, New Jersey magnetic and foreign; product, foundry, gray forge, and Bessemer pig iron. Iron actually made in one year, 27,845 net tons. B. F. Fackenthal, Jr., General Manager; John S. Fackenthal, Superintendent. New York office, 17 Burling Slip. *See Ringwood Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Port Oram and Warren Furnaces, Joseph Wharton, P. O. Box 1,332, Philadelphia. Post office and telegraph address of furnaces, Boonton, N. J., Tooke Straker, Manager. Two stacks. Port Oram Furnace, at Port Oram, Morris county, 60×16 , built in 1868, and first blown in in 1869; ore, local magnetic. Warren Furnace, at Hackettstown, Warren county, 56×16 , built in 1874-5, and put in blast in 1875; ores, mainly North Jersey magnetic, with mixture of hematite. Fuel used in both furnaces, anthracite coal and coke; product, neutral foundry and forge pig iron; total annual capacity, 26,000 net tons.

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

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

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

PENNSYLVANIA.

LEHIGH VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Allentown Iron Works, Allentown Iron Company, 222 and 224 South Third st., Philadelphia. Works at Allentown, Lehigh county. Three stacks: No. 1, $53\frac{1}{2} \times 14\frac{1}{2}$, built and blown in in 1846; No. 4, $60 \times 16\frac{1}{2}$, built and blown in in 1886; and No. 5, 60×17 , built in 1872, and blown in in 1873; fuel, all anthracite coal; ores, New York, New Jersey, and Pennsylvania magnetic and local hematite; foundry pig

iron is a specialty; total annual capacity, 53,000 net tons. Brand, "Allentown." (Three stacks, built in 1846 and 1853, have been abandoned.) Frederick Prime, Jr., President, 222 South Third st., Philadelphia; John Lowber Welsh, Treasurer.

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, Bethlehem, Northampton county. Seven stacks: No. 1, 61 x 15½, built in 1863; No. 2, 70 x 16, built in 1867; No. 4, 70 x 18, built in 1874-5; No. 5, 70 x 18, built in 1874-5; No. 6, 70 x 19, built in 1881; No. 7, (North Penn.) 65 x 17, situated at Bingen; Northampton county, built in 1870; Northampton Furnace, 65 x 15, situated at Freemansburg, Northampton county, first blown in July 17, 1873. Nos. 2 and 6 are equipped with Siemens-Cowper-Cochrane hot-blast stoves; the others have iron stoves. (No. 3, 50 x 13, built in 1868; not likely to go into blast again.) Product, Bessemer pig iron, from local and foreign hematite and magnetic ores; fuel, anthracite coal and Connellsville coke; total annual capacity, 160,000 net tons. *See Rolling Mills.*

Carbon Iron Works, Carbon Iron and Pipe Company Limited, Mauch Chunk, Carbon county. Works at Parryville, in the same county. Three stacks, 52 x 13, 52 x 16, and 65 x 16, built in 1855, 1864, and 1869, respectively; one open and two closed tops; fuel, anthracite coal; ores, hematite from Lehigh, Northampton, and Carbon counties, magnetic from New Jersey and Lake Champlain, and foreign; total annual capacity, 30,000 net tons. Product known as "Carbon" iron. M. S. Kemmerer, Chairman, and George Ruddle, Secretary and Treasurer, Mauch Chunk; H. P. Cooper, Superintendent, Parryville. Selling agents, George W. Stetson & Co., 69 Wall st., New York.

Coleraine Iron Works, William T. Carter & Co., 302 Walnut st., Philadelphia. Works at Reddington, Northampton county. Two stacks, each 60 x 17, built in 1869 and 1872; ores, ½ hematite and ½ magnetic; product, foundry pig iron; total annual capacity, 26,000 net tons.

Coplay Iron Company Limited, Coplay, Lehigh county. Three stacks, 60 x 14, 55 x 16, and 55 x 16, built in 1853, 1862, and 1868, respectively; open tops; ores, Lehigh county hematite and New Jersey magnetic; product, principally foundry pig iron; total annual capacity, 30,000 net tons. E. P. Wilbur, Chairman, Bethlehem; W. H. Ainey, Secretary and Treasurer, Allentown; A. F. K. Krout, Clerk, Coplay; H. Bortz, Superintendent, Allentown.

Crane Iron Works, Crane Iron Company, 224 South Fourth st., Philadelphia. Works at Catasauqua, Lehigh county. Five stacks: one 75 x 18, three 60 x 17, and one 55 x 17. Original furnaces built in 1839,

1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881. Two have iron hot-blast stoves, and three have Whitwell fire-brick stoves; fuel, anthracite coal; ores, New Jersey magnetic, Pennsylvania hematite, and foreign; specialties, foundry, open-hearth, and Bessemer pig iron; annual capacity, 110,000 net tons. Brand, "Crane." Samuel Dickson, President; Geo. T. Barns, Secretary and Treasurer. Officers at Catasauqua: William R. Thomas, Superintendent; John Williams, Cashier.

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; eight Cooper-Durham iron hot-blast stoves; fuel, anthracite coal and Connellsville coke; ores, local hematite and magnetic, New Jersey magnetic, and foreign; specialties, gray forge and Bessemer pig iron; iron actually made in one calendar year, 37,448 net tons. Brand, "Durham." The two old stacks, built in 1848 and 1851, have been demolished. B. F. Fackenthal, Jr., General Superintendent. Selling agents, J. Tatnall Lea & Co., Philadelphia. *See Pequest and Ringwood Furnaces, New Jersey.*

Emaus Furnace, Donaldson Iron Company, lessee, Emaus, Lehigh county. Main office, 226 Walnut st., Philadelphia. One stack, 66 x 16, completed and first put in blast October 10, 1872, rebuilt in 1879-80; fuel, anthracite coal; ores, local hematite and New Jersey magnetic; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Emaus." John Donaldson, President, 226 Walnut st., Philadelphia; George Ormrod, Manager and Treasurer, Emaus. During 1883 the lessees of the furnace built a foundry for the production of cast-iron gas and water pipe, with a daily capacity of 50 net tons. Selling agents, Donaldson & Duncan, 226 Walnut st., Philadelphia.

Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Established in 1843. Five stacks: one 63 x 16, one 81 x 18, one 80 x 18, one 47 x 15, and one 72 x 18. Original furnaces were first blown in in 1844, 1845, 1850, 1852, and 1869; rebuilt in 1851, 1876, 1880, and 1882. These furnaces are at Glendon, near Easton, except Furnace No. 4, which is situated at South Easton. No. 4 is blown by water-power and has the only open top; No. 1 is blown by either water or steam power; fuel, anthracite coal, with sometimes a little Snow Shoe coke; ores, hematite from Northampton county, Pa., and magnetic from Morris county, N. J.; specialty, forge pig iron; total annual capacity, 100,000 net tons. Brand, "Glendon." Principal office at Boston, Mass. Augustus Lowell, President, and Thomas T. Bouvé, Secretary and Treasurer, Boston; Morris P. Janney, Superintendent, Easton.

Lehigh Iron Company, Allentown, Lehigh county. Two stacks: No. 1, 65 x 16, completed July 22, 1869, rebuilt in 1886, closed top; No. 2, 60 x 17, completed October 21, 1872, open top; fuel, anthracite coal; ores,

Lehigh county hematite and New Jersey magnetic; specialty, foundry pig iron; total annual capacity, 21,000 net tons. Brand, "Lehigh." W. H. Ainey, President and Treasurer; H. Bortz, Secretary and Manager of the works.

Lehigh Zinc and Iron Company, Bethlehem, Northampton county. Main office, 47 North Front st., Philadelphia. One stack, 33 x 8½, first put in blast in February, 1882; fuel, anthracite coal and coke; ore, residuum from Franklinite ore, after the zinc has been extracted; product, spiegeleisen; annual capacity, 2,000 net tons. Richard Heckscher, President; S. P. Wetherill, Vice-President; J. Price Wetherill, General Manager; J. H. Troutman, Secretary; August Heckscher, Treasurer.

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

Thomas Iron Works, Thomas Iron Company, Hokendauqua, Lehigh county. Twelve stacks, (eleven owned and one leased,) located as follows: six at Hokendauqua, two (Lock Ridge) at Alburtis, Lehigh county, two (Saucon) at Hellertown, Northampton county, and two (Keystone and Lucy) at Glendon, Northampton county. At Hokendauqua there are two stacks 60 x 16, two 60 x 17, and two 65 x 17, of which 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. The Keystone Furnace at Glendon is 65 x 16, and was first put in blast April 17, 1876; the Lucy Furnace, also at Glendon, is 65 x 14, and was built in 1872, rebuilt in 1880. The Saucon Furnaces at Hellertown are each 60 x 16, and were first blown in March 25, 1868, and May 25, 1870, respectively. The Keystone Furnace has Whitewell stoves; all others have iron pipe stoves. Fuel, anthracite coal. All use native hematite and New Jersey magnetic ores; 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; Daniel Davis, Superintendent of Lock Ridge Furnaces; Fletcher H. Knight, Superintendent of Keystone and Lucy Furnaces; Horace Boyd, Superintendent of Saucon Furnaces. Sales made by B. G. Clarke, 52 Wall st., New York; J. T. Knight, Easton; and Lyman & Co., Philadelphia.

Number of furnaces in the Lehigh region: 48 stacks.

SCHUYLKILL VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Anvil Furnace, Pottstown Iron Company, Pottstown, Montgomery county. One stack, 65 x 15, built in 1867, and blown in in December, 1867; fuel, anthracite coal and coke; ores, magnetic and hematite; annual capacity, 20,000 net tons. Brand, "Anvil." *See Rolling Mills.*
- Chester Furnace, Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. One stack, 70 x 16, first blown in in November, 1881; fuel, anthracite coal and coke; ore, foreign; equipped with 3 Whitwell stoves; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Chester." *See Rolling Mills.*
- Edge Hill Furnace, Charles Richardson & Sons, Edge Hill, Montgomery county. One stack, 65 x 16½, built in 1869-72; first blown in in January, 1872; fuel, anthracite coal and coke; ores, mostly domestic, and occasionally a portion of foreign; product, foundry and mill pig iron; annual capacity, 28,000 net tons.
- Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13; one built in 1842, and blown in in August, 1844; the other built in 1855, and blown in in September, 1856; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, No. 2 foundry and gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Henry Clay." Selling agent, Charles W. Matthews, Philadelphia. *See Boonton Furnaces, New Jersey.*
- Keystone Furnaces, E. and G. Brooke Iron Company, Birdsboro, Berks county. Three stacks: one, 50 x 12, built in 1853; one, 55 x 15, built in 1871; one, 60 x 16, built in 1873; fuel, anthracite coal and coke; ores, principally magnetic, with a mixture of hematite; product, forge pig iron; total annual capacity, 45,000 net tons. Brand, "Keystone." *See Rolling Mills.*
- Keystone Furnaces of Reading, Keystone Furnace Company, Reading, Berks county. Two stacks: one, 50 x 15, built in 1869; the other, 50 x 14, built in 1872-3, blown in in June, 1873; product, principally foundry pig iron; total annual capacity, 20,500 net tons. Brand, "Bushong." Henry Bushong, President; H. M. Bushong, Secretary and Treasurer. Selling agents, Crocker Brothers, 32 Cliff st., New York.
- Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One stack, 58 x 16, built in 1852, first blown in in 1853, and rebuilt in 1871; fuel, anthracite coal; ores, local magnetic and hematite; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Leesport." R. T. Leaf, President, Reading; P. R. Stetson, Secretary and Treasurer, Reading. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia.
- Lucinda Furnace, Lucinda Furnace Company, Norristown, Montgomery county. One stack, 40 x 13, built in 1856; fuel, anthracite coal and coke; ore, foreign; product, Bessemer pig iron; annual capacity, 10,-

- 000 net tons. Brand, "Lucinda." R. C. Fulton, President, Norristown; J. Lansing Mines, Secretary and Treasurer, 235 South Third st., Philadelphia.
- Marion Furnace, Norwegian Iron Company, Minersville, Schuylkill county. One stack, 55 x 15, first blown in September 5, 1873; rebuilt in 1880; fuel, anthracite coal; annual capacity, 10,000 net tons. Formerly called Minersville Furnace.
- Merion and Elizabeth Furnaces, Merion Iron Company, West Conshohocken, Montgomery county. Philadelphia office, 209 Walnut Place. Two stacks: Merion Furnace, 48 x 16, built in 1847, and enlarged in 1876; Elizabeth Furnace, 50 x 16, built in 1872, put in blast October 24, 1872; both stacks remodeled in 1883; ores, New York and New Jersey magnetic and local hematite; product, foundry and forge pig iron; combined capacity, about 600 net tons per week. Brand, "Merion." Specialty, neutral gray forge pig iron for boiler plate and sheet iron. J. B. Moorhead, President.
- Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, 50 x 13, built in 1854, and first blown in 1856; remodeled in 1863 and again in 1869; ores, magnetic and hematite; specialty, forge pig iron; annual capacity, 16,000 net tons. Brand, "Montgomery." Abraham S. Patterson, President; Joseph Storm Patterson, Secretary and Treasurer; John W. Eckman, Manager.
- Moselem Furnace, Sheble & Stelwagon, Moselem, Berks county. One stack, 49 x 12, built in 1823 for charcoal, and rebuilt several times; annual capacity, 8,000 net tons. Not in blast. For sale. Apply to Dr. T. H. Seyfert, 1709 Mount Vernon st., Philadelphia.
- Mt. Laurel Furnace, Clymer Iron Company, Temple, Berks county. Furnace at Mt. Laurel. One stack, 50 x 12, built in 1836, rebuilt in 1847, and altered for anthracite in 1873, but not afterwards blown in until February 1, 1880; ore, principally hematite; product, foundry pig iron; annual capacity, 10,000 net tons. George E. Clymer, President; Abram Sweitzer, Treasurer and Superintendent. Selling agent, J. J. Mohr, 430 Walnut st., 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; fuel, anthracite coal and coke; ore, foreign; product, standard Bessemer pig iron; annual capacity, 28,000 net tons. James Hooven, owner.
- Norway Furnace, Gabel, Jones & Gabel, lessees, Pottstown. Furnace at Bechtelsville, Berks county. One stack, 58½ x 15, built in 1875, and first blown in in 1880; open top; fuel, anthracite coal and coke; ores, Berks county magnetic, Lancaster county hematite, and foreign; product, very soft and strong foundry and very strong neutral mill pig iron; annual capacity, 17,500 net tons. Specialty, No. 1 X pig iron.

Brand, "Norway." Jacob H. Gabel, Treasurer; Griffith Jones, Superintendent. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Six stacks. East Penn Furnaces, at Lyons Station, Berks county; two stacks, each $45\frac{1}{2} \times 13\frac{1}{4}$, built in 1874-5; will probably be rebuilt as a single stack; total annual capacity, 17,000 net tons. Kutztown Furnace, at Kutztown, Berks county; one stack, $55 \times 14\frac{1}{4}$, built in 1875; annual capacity, 8,300 net tons. Port Carbon Furnace, at Port Carbon, Schuylkill county; one stack, 65×15 , first put in blast in September, 1872; rebuilt in 1879 and 1881. Ringgold Furnace, at New Ringgold, Schuylkill county; one stack, 52×13 , first blown in February 28, 1874; annual capacity, 7,000 net tons. Monocacy Furnace, Monocacy, Berks county; one stack, 50×13 , built at Hopewell in 1852; removed to Monocacy in 1854; annual capacity, 10,000 net tons. The foregoing furnaces are offered for sale or lease. (The Emaus Furnace, at Emaus, Lehigh county, the Norway Furnace, at Bechtelsville, Berks county, the Swede Furnace, at Swedeland, Montgomery county, and the Minersville (Marion) Furnace, at Minersville, Schuylkill county, are also owned by this company but are operated by other parties on lease, and are described in their proper places elsewhere.) Austin Corbin, President; George deB. Keim, Stephen A. Caldwell, and Austin Corbin, Receivers; John Birkinbine, Engineer. *See Rolling Mills.*

Philadelphia Furnace, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. One stack, 58×14 , built in 1873, and blown in December 5, 1873; ores, domestic and foreign; product, forge and foundry pig iron; annual capacity, 10,000 net tons. *See Rolling Mills in Philadelphia.*

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Three stacks: No. 1, 59×15 , built in 1845, and rebuilt in 1871; No. 2, $58\frac{1}{4} \times 15$, built in 1845, and rebuilt in 1871; No. 3, 59×15 , 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. Three stacks: No. 1, 60×12 , rebuilt in 1853; No. 2, 60×13 , built in 1866; and No. 3, 65×14 , built in 1872; fuel, anthracite coal; ore, foreign; product, Bessemer pig iron; total annual capacity, 36,000 net tons. Brand, "Pioneer." *See Rolling Mills.*

Plymouth Furnaces, Plymouth Rolling Mill Company, Conshohocken, Montgomery county. Philadelphia office, 261 South Fourth st. Two stacks, 55×16 and 55×14 , built in 1845 and 1864, respectively; fuel,

anthracite coal and coke ; ores, Pennsylvania hematite and magnetic ; product, foundry and forge pig iron ; annual capacity, 20,000 net tons. Brand, "Plymouth." *See Rolling Mills.*

Reading Iron Works, Reading, Berks county. Office, 259 South Fourth st., Philadelphia. Two stacks, each 55 x 14½, built in 1854 and 1873, respectively ; remodeled in 1886 ; ore, principally hematite from Lehigh and Lebanon counties ; product, foundry and mill pig iron ; total annual capacity, 50,000 net tons. *See Rolling Mills.*

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

Sheridan Furnaces, Wm. M. Kaufman & Co., Sheridan, Lebanon county. Two stacks : one, 74 x 13, built in 1862 to use charcoal, and changed to anthracite in 1867 ; the other, 78½ x 15, built in 1874-5 ; product, principally foundry pig iron ; total annual capacity, 45,000 net tons.

Swede Furnace, R. Heckscher & Sons, lessees, Bridgeport, Montgomery county. Furnace at Swedeland, in the same county. Main office, 238 South Third st., Philadelphia. One stack, 73 x 14, built in 1850, and rebuilt in 1881 ; closed top ; 2 Weimer hot-blast stoves ; fuel, anthracite coal and Connellsville coke ; ores, local hematite and New Jersey magnetic ; product, foundry pig iron ; annual capacity, 15,000 net tons. Brand, "Swede." A. Walters, Superintendent. Selling agents, R. & A. Heckscher & Co., Philadelphia.

Temple Furnace, Temple Iron Company, Temple, Berks county. One stack, 55 x 14, built in 1867, and rebuilt in 1875 ; ores, from Lehigh, Berks, and Lebanon counties ; specialty, foundry pig iron ; annual capacity, 13,440 net tons. Brand, "Temple." William D. Smith, President ; Edward T. Clymer, Treasurer and Manager, 249 North Fifth st., Reading. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia.

Topton Furnace Company, Isaac Eckert, Manager, Topton, Berks county. One stack, 70 x 16, built in 1873, and remodeled in 1887. Henry S. Eckert, William M. Kaufman, and Isaac Eckert, owners.

Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery county. One stack, 55½ x 15½, built in 1875, and first blown in in April, 1876 ; fuel, ¾ anthracite coal and ¼ coke ; ores, magnetic, from Boyertown and Seisholtzville, Berks county, and foreign ; specialty, mill pig iron ; annual capacity, 33,000 net tons. Brand, "Warwick." Isaac Fegely, President ; V. P. McCully, Secretary ; Jacob Fegely, Treasurer ; Edgar S. Cook, Manager.

Number of furnaces in the Schuylkill region : 44 stacks.

UPPER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 55 x 14, built in 1853-4, and blown in April 14, 1854; rebuilt in 1881 and 1886; ores, fossil, mined in the vicinity, and magnetic from New Jersey; product, gray forge and No. 2 foundry pig iron; annual capacity, 14,500 net tons. Brand, "Bloom."
- Chulasky Furnace, 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. Out of blast. Owned by the First National Bank of Danville, Pa.
- Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks, 39 x 14 and 50 x 14, built in 1840 and 1860, respectively; 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; ores, Cornwall magnetic from Lebanon county and hematite from Mifflin county and from Virginia; specialty, mill pig iron; annual capacity, 20,000 net tons. Brand, "Duncannon." *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, 15,000 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." Charles R. Paxton, President, Bloomsburg; William E. S. Baker, Treasurer, 122 Race st., Philadelphia; F. P. Drinker, Secretary; E. R. Drinker, Manager.
- Lackawanna Furnaces, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Five stacks: two built in 1849, one in 1852, one in 1854, and one in 1872; sizes, 73 x 20½, 65 x 17, 65 x 17, 70 x 17½, and 70 x 19; fuel, anthracite coal and coke; ores, chiefly magnetic, with some roasted carbonate, from Lake Champlain and Putnam county, New York; product, Bessemer pig iron; total annual capacity, 110,000 net tons. Brand, "Lackawanna." E. S. Moffat, Superintendent of furnaces. New York office, 52 Wall st. *See Rolling Mills.*
- Marshall Furnace, Marshall Brothers, Newport, Perry county. Philadelphia office, 24 Girard avenue. One stack, 60 x 14, built in 1871, and blown in in July, 1872; fuel, anthracite coal and coke; ores, local magnetic, fossil, and hematite; product, foundry pig iron and gray forge pig iron for sheet and plate iron; annual capacity, 15,000 net tons. Brand, "Marshall." P. Hiestand, Superintendent.
- Montour Iron and Steel Company, Danville, Montour county. Philadelphia office, 227 South Fourth st. Two stacks, each 52 x 15, built

- in 1842; fuel, anthracite coal and Clearfield coke; ore, local fossil; product, cold-short foundry pig iron; total annual capacity, 24,000 net tons. (A third stack was abandoned in 1880.) *See Rolling Mills.*
- North Branch Furnaces, North Branch Steel Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Two stacks, 61 x 16 and 43 x 13, built in 1869 and 1867, respectively; both remodeled in 1884; fuel, anthracite coal and coke; ores, soft fossil, mined in Montour county, and hematite and magnetic from New York and New Jersey; product, Bessemer pig iron; total annual capacity, 30,000 net tons. *See Rolling Mills.*
- Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; ore, fossil; product, principally foundry iron; annual capacity, 7,000 net tons. Dr. L. Rooke, Manager. Number of furnaces in the Upper Susquehanna region: 18 stacks.

LOWER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

- Aurora Furnace, Schall, Steacy & Denney, Wrightsville, York county. Main office, York. One stack, 55 x 12, built in 1867, rebuilt in 1874, and remodeled in 1886-7; new blowing engine of greater capacity added; fuel, anthracite coal and coke; ores from York, Perry, and Lebanon counties; product, neutral forge and foundry pig iron; annual capacity, 14,000 net tons. *See Rolling Mills.*
- Bird Coleman, Donaghmore, and North Cornwall Furnaces, W. C. Freeman, Chairman, Cornwall, Lebanon county. Four stacks. Bird Coleman Furnaces, owned by Cornwall Iron Company Limited; No. 1, 75 x 18, built in 1872-3, and rebuilt in 1885; No. 2, 75 x 18, built in 1879-80, and rebuilt in 1885. Donaghmore Furnace, owned by Cornwall Iron Company Limited; one stack, 44 x 14, built in 1855. North Cornwall Furnace, owned by Mrs. M. C. Freeman; one stack, 52 x 15, built in 1872-4. Use Cornwall ore exclusively; fuel, anthracite coal and coke; equipped with Whitwell and pipe stoves; specialty, Bessemer pig iron. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia. *See Charcoal Furnaces.*
- Cameron Furnace, Cameron Furnace Company, Middletown, Dauphin county. One stack, 47½ x 13½, first put in blast December 26, 1853, and rebuilt in 1856; fuel, anthracite coal and coke; ores, York and Cumberland hematite; product, principally forge pig iron; annual capacity, 9,000 net tons. Brand, "Cameron." James Young, President; J. H. Landis, Secretary and Manager.
- Chestnut Hill Furnaces, Chestnut Hill Iron Ore Company, Jerome L. Boyer, Superintendent, Reading. Works at Columbia, Lancaster county. Two stacks: one, 60 x 15, built in 1854, and remodeled in 1881; and one, 60 x 15, built in 1868, and remodeled in 1886; (a third stack, No. 1, now abandoned, was built in 1845;) fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, Ebbvale, (Maryland,) and New

Jersey; specialty, foundry pig iron; annual capacity, 45,000 net tons. Brand, "Chestnut Hill." Main office, 52 Wall st., New York; B. G. Clarke, President, and Charles E. Sturges, Treasurer.

Chickies Furnaces, Chickies Iron Company, (successors to E. Haldeman & Co.,) Chickies, Lancaster county. Two stacks: No. 1, 65 x 12, rebuilt in 1887; original stack built in 1845, and blown in January 15, 1846; No. 2, 45 x 12, built in 1854, blown in in 1855; fuel, anthracite coal and coke; ores, magnetic from Cornwall, Lebanon county, and Chestnut Hill brown hematite from Silver Spring, Lancaster county; product, foundry and mill pig iron. Brand, "Chickies." No. 2 Furnace will be rebuilt in 1887-8, and made 65 x 12. Paris Haldeman, President; Horace L. Haldeman, Secretary and Treasurer. Selling agents, Justice Cox, Jr., & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; Stroud & Co., New York; and James B. Scott & Co., Pittsburgh.

Colebrook, Cornwall Anthracite, and Lochiel Furnaces, Robert H. Coleman, Cornwall, 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, has made 848 gross tons of pig iron per week on all Cornwall ore. Cornwall Anthracite Furnaces, at Cornwall; No. 1, 38 x 12, built in 1854; No. 2, 38 x 13, remodeled in 1885; use Cornwall ore exclusively. Lochiel Furnace, at Harrisburg; one stack, 65 x 14, first put in blast in April, 1873, and remodeled in 1886; uses Cornwall ore exclusively.

Conestoga Furnace, Peacock & Thomas, Lancaster, Lancaster county. Philadelphia office, 242 South Third st. One stack, 38 x 10½, built in 1846, and remodeled in 1872; ores, Lancaster county hematite exclusively; specialty, foundry pig iron, known as "Conestoga" iron; annual capacity, 6,500 net tons. Selling agent, E. Bertolet, Philadelphia.

Conewago Furnace, Conewago Iron Company, Middletown, Dauphin county. Formerly called Middletown Furnace. One stack, 45 x 11, built in 1853, and rebuilt in 1879; fuel, anthracite coal and coke; ores, Cornwall magnetic and Chestnut Hill hematite; product, "Chickies" pig iron, exclusively for the Chickies Iron Company. Paris Haldeman, President; Henry B. Grubb, Vice-President; Horace L. Haldeman, Treasurer; Frank Nisley, Secretary; F. E. Bachman, Manager.

Cordelia Furnace, Cordelia Iron Company, Cordelia, Lancaster county. Formerly called Kauffman Furnace. One stack, 50 x 13, built in 1848, and rebuilt in 1859; ores, hematite and magnetic from Pennsylvania, Maryland, and New Jersey; specialty, foundry pig iron; annual capacity, 9,000 net tons. Brand, "Cordelia." H. A. Muhlenberg, President; Wilson V. McHose, Secretary; Isaac McHose, Treasurer and General Manager.

- Katherine Furnace, C. W. Ahl's Son, Carlisle, Cumberland county. Works at Boiling Springs. One stack, 50 x 11, built in 1881-2; fuel, anthracite coal and coke; ore, local brown hematite; product, neutral foundry and forge pig iron. Brand, "Carlisle."
- Lebanon Furnaces, Arthur and Horace Brock, Managers, Lebanon, Lebanon county. Two stacks: one, 80 x 17, built in 1845, reconstructed in 1868, and rebuilt in 1885; the other, 65 x 17, built in 1872-3, put in blast in August, 1873; two sets of Whitwell fire-brick hot-blast stoves; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron; combined capacity of the two furnaces, about 1,800 net tons a week. (A third stack, 36 x 12, built in 1847, has been torn down.)
- Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867, blown in December 23, 1867; remodeled in 1884; two Whitwell fire-brick hot-blast stoves; fuel, anthracite coal and coke; ores, principally Cornwall; specialty, gray forge red-short pig iron; annual capacity, 22,000 net tons. Brand, "Lebanon Valley." *See Bloomaries.*
- Marietta Furnaces, George Dawson Coleman, Marietta, Lancaster county. Two stacks: one, 50 x 12½, built in 1847, and remodeled in 1880; and one, 38 x 12, built in 1849; total annual capacity, 12,000 net tons.
- Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two stacks, 52 x 13 and 75 x 14, built in 1855 and 1872, respectively; five Whitwell fire-brick stoves; fuel, anthracite coal and coke; a variety of ores used; product, mill and Bessemer pig iron; total annual capacity, 40,000 net tons. Brand, "Paxton." Owned by the McCormick Estate. *See Rolling Mills.*
- Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Five stacks. No. 1, 60 x 14, built in 1872-3, and put in blast in October, 1873, remodeled in 1883, and supplied with two Whitwell stoves. No. 2, 80 x 20, built in 1874-6, put in blast in June, 1876, remodeled in 1877, and supplied with three Whitwell stoves. Nos. 3 and 4, each 70 x 18; No. 3 first put in operation in February, 1884, and No. 4 first put in operation in April, 1884; each has three Whitwell stoves. No. 5, 55 x 11, built in 1873-4, and remodeled in 1882; iron stoves. Fuel, anthracite coal and coke; ores, foreign and domestic hematite and magnetic; specialty, Bessemer pig iron; total annual capacity, 175,000 net tons. *See Mixed Anthracite and Coke Furnaces, Maryland. See Rolling Mills.*
- Richmond Furnace, Southern Pennsylvania Railroad and Iron and Mining Company, Richmond Furnace, Franklin county. Formerly called Mount Pleasant Iron Works. One stack, 36 x 9½, built in 1865, and rebuilt in 1875; open top; fuel, anthracite coal and coke; ores from the Richmond mines, two miles from the furnace; annual capacity, 5,500 net tons. Not in blast for several years. T. B. Kennedy, Manager, Chambersburg.

St. Charles Furnaces, C. B. Grubb & Son, Lancaster, Lancaster county. Works at Columbia. Two stacks: No. 1, 52 x 14, built in 1853; the other, 57 x 12, built in 1845, formerly known as the Henry Clay, is now the St. Charles Furnace No. 2; remodeled in 1879 and 1880; fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, and Conestoga; product, pig iron which is well known as exceptional in quality for boiler plate, bars, nails, or foundry work; total annual capacity, 20,000 net tons. Brand, "Grubb." Charles B. Grubb, Secretary and Treasurer; Joseph Eckman, Superintendent.

Swatara Furnace, Swatara Furnace Company, lessee, 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, magnetic, brown hematite, and fossil from Lebanon, Dauphin, and Juniata counties; product, gray forge pig iron; annual capacity, 8,000 net tons. Brand, "Swatara." Formerly called Union Deposit Furnace. John Q. Denney, President; D. Watts, Secretary and Treasurer.

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

Wister Furnace, Philadelphia and Reading Railroad Company, 227 South Fourth st., Philadelphia. Furnace at Harrisburg, Dauphin county. One stack, 60 x 14, first blown in February 15, 1868; purchased by this company in 1883 to secure right of way for the South Pennsylvania Railroad Company. Not in blast in 1886 or 1887.

Number of furnaces in the Lower Susquehanna region: 37 stacks. A cupola furnace, named Ruby Furnace, has been operated for three years by Albert Ferguson & Co., at Colebrook, Lebanon county, extracting pig iron from slag.

SHENANGO VALLEY—BITUMINOUS COAL OR COKE.

Claire Furnace Company Limited, Sharpsville, Mercer county. One stack, 75 x 15½, built in 1869, and rebuilt in 1886; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 40,000 net tons. This stack takes the place of two stacks built in 1869, and formerly called Mount Hickory Furnaces. 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 15, 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; fuel, Connellsville coke; ore, Lake Superior; specialty, pig iron for Bessemer and Siemens-Martin steel; combined annual capacity, 60,000 net tons. Brand, "Douglas."

Ella and Fannie Furnaces, Wheeler Furnace Company, lessee, Sharon, Mercer county. Two stacks at West Middlesex. Ella Furnace, 70 x 15, built in 1882, occupies the site of the two Shenango Furnaces, which were built in 1859 and torn down in 1882. Fannie Furnace, 60 x 12½, first put in blast October 13, 1873, and remodeled in 1885. Fuel, coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity of Ella Furnace, 36,000 net tons, and of Fannie Furnace, 26,000 net tons. Brand, "Wheeler." E. A. Wheeler, Manager. Pickands, Mather & Co., Cleveland, Ohio, proprietors and selling agents.

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; fuel, coke; ore, Lake Superior; specialty, gray forge pig iron; annual capacity, 40,000 net tons. Brand, "Etna." Have blowing capacity sufficient to run only one furnace at a time. *See Rolling Mills.*

Florence Furnace, Henderson Iron Company, Sharpsville, Mercer county. One stack, 60 x 12, built in 1868, put in operation in October, 1868; remodeled in 1882; ore, strictly Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 18,000 net tons. Formerly called Henderson Furnace.

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

Mabel Furnaces, Perkins & Co. Limited, Sharpsville, Mercer county. Two stacks, each 65 x 14; No. 1 built in 1872, and No. 2 in 1880; both rebuilt in 1883; fuel, block coal and coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 35,000 net tons. Brand, "Mabel." S. Perkins, Jr., Chairman and Manager; L. C. Hanna, Secretary and Treasurer. Selling agents, M. A. Hanna & Co., Cleveland.

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

Raney & Berger, New Castle, Lawrence county. One stack, 60 x 16, built in 1872, put in blast in May, 1872; fuel, coke; ore, Lake Su-

- perior; product, foundry pig iron; annual capacity, 40,000 net tons. Brands, "Norway," "Crown," and "Hecla."
- Rosena Furnace, Oliver Brothers & Phillips, Pittsburgh. Furnace at New Castle, Lawrence county. One stack, 77 x 20, built in 1872, and first put in blast in June, 1873; fuel, coke; ore, Lake Superior; product, foundry pig iron; total annual capacity, 38,000 net tons. George E. Tener, Superintendent. *See Rolling Mills.*
- Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer county. One stack, 60 x 12, built in 1845, and rebuilt in 1882; fuel, coke; ore, Lake Superior hematite; product, foundry and forge pig iron; annual capacity, 25,000 net tons. Brand, "Sharon." Norman Hall, Manager.
- Sharon Iron Company, Sharon, Mercer county. Two stacks: one, 72 x 15½, built in 1865, and rebuilt in 1887; and one, 72 x 15, built in 1866, and enlarged in 1883; fuel, raw coal and Connellsville coke; ore, Lake Superior; specialty, No. 1 mill pig iron; combined 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; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 30,000 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; three Whitwell hot-blast stoves; fuel, coke; ore, Lake Superior; product, foundry pig iron; combined 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; fuel, Connellsville coke; ore, Lake Superior; product, strictly Bessemer pig iron; combined annual capacity, 62,000 net tons. Formerly called Valley Furnaces. S. McClure, Agent. *See Rolling Mills.*
- Number of furnaces in the Shenango Valley: 22 stacks.

ALLEGHENY COUNTY—COKE.

- Carrie Furnace, Carrie Furnace Company, Pittsburgh. Furnace at Rankin Station, Allegheny county. One stack, 80 x 18, removed from Ohio in 1883, blown in February 29, 1884; ore, Lake Superior; product, mill, foundry, and Bessemer pig iron; estimated annual capacity, 50,000 net tons. Joseph S. Brown, President; E. S. Fownes, Secretary; H. C. Fownes, Treasurer; W. C. Fownes, Manager.
- Clinton Furnace, Graff, Bennett & Co., Pittsburgh. One stack, 45 x 12, built in 1859; ores, principally Lake Superior; annual capacity, 16,000 net tons. *See Rolling Mills.*

Edgar Thomson Furnaces, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Seven completed stacks. Furnace A, 65 x 13, built in 1879, has three Siemens-Cowper-Cochrane stoves, each 55 x 15, and one Whitwell stove, 65 x 15. Furnaces B and C, each 80 x 20, built in 1880, have six Siemens-Cowper-Cochrane stoves, each 60 x 20, and two Whitwell stoves, each 75 x 21. Furnaces D and E, each 85 x 20, built in 1881, have seven Siemens-Cowper-Cochrane stoves of an improved type. Furnaces F and G, each 85 x 20, built in 1886 and 1887, have seven Siemens-Cowper-Cochrane stoves. Fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, Missouri, and foreign; product, Bessemer pig iron, spiegeleisen, and ferro-manganese. Combined annual capacity, 450,000 net tons. James Gayley, Superintendent of furnaces. *See Rolling Mills.*

Edith Furnace, Edith Furnace Company, Allegheny City. One stack, 70 x 16, built in 1882 to replace the two Superior Furnaces built in 1862-3, and first put in operation in November, 1882; four fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, mill pig iron; annual capacity, 30,000 net tons. Brand, "Edith." E. C. Converse, Chairman; C. I. O'Connor, Secretary and Treasurer; Joseph R. Jackson, Superintendent.

Eliza Furnaces, Laughlin & Co. Limited, Pittsburgh. Three stacks: one 61 x 16 and one 61 x 14, built in 1861, and enlarged in 1873 and 1874, and one 80 x 20, built in 1886-7, and blown in in June, 1887; fuel, coke; ore, Lake Superior; specialty, mill pig iron; total annual capacity, 115,000 net tons. Brand, "Eliza." Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.

Isabella Furnaces, Isabella Furnace Company, Etna, Allegheny county. Two stacks, each 75 x 20, built in 1872; each stack supplied with three 70 x 21 Whitwell stoves; ore, Lake Superior; product, foundry and mill pig iron; total annual capacity, about 150,000 net tons. Hugh Kennedy, Manager.

Lucy Furnaces, Carnegie, Phipps & Co. Limited, Fifty-first st., (branch office, 48 Fifth avenue,) Pittsburgh. Two stacks, each 75 x 20; No. 1 first put in blast in May, 1872, and No. 2 first put in blast September 27, 1877; seven Whitwell hot-blast fire-brick stoves; ores, mainly Lake Superior; product, Bessemer, forge, and foundry pig iron; aggregate annual capacity, about 150,000 net tons. Brand, "Lucy." Julian Kennedy, General Superintendent; Walter Kennedy, Manager. *See Rolling Mills.*

Shoenberger Furnaces, Shoenberger, Speer & Co., Pittsburgh. Two stacks, one 62 x 13½ and one 62 x 14, built in 1865; fuel, coke; ores, Lake Superior, native, and foreign; product, Bessemer, foundry, and gray forge pig iron; combined annual capacity, 65,000 net tons.

Soho Furnace, Moorhead-McCleane Company, Pittsburgh. One stack,

67 x 18, built in 1872, put in blast November 22, 1872; fuel, Connells-ville coke; ore, Lake Superior; specialty, low-phosphorus Bessemer pig iron; annual capacity, 45,000 net tons. Brand, "Soho." *See Rolling Mills.*

Number of furnaces in Allegheny county: 20 stacks.

BITUMINOUS COAL OR COKE—MISCELLANEOUS.

41
88
Bellefonte Furnace Company, Bellefonte, Centre county. Main office, Bullitt Building, 139 South Fourth st., Philadelphia. One stack, 70 x 15, built in 1887, and to go in blast January 1, 1888; three Whitwell hot-blast stoves; fuel, coke; ore, native hematite; annual capacity, 35,000 net tons. John Reilly, President; W. H. Hollis, Secretary and Treasurer; Fritz Gleim, Superintendent. (1)

2
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; combined annual capacity, 30,000 net tons. John W. Townsend, President, Philadelphia; W. S. Robinson, Secretary and Treasurer, Philadelphia; E. R. Baldrige, Superintendent, Hollidaysburg; P. E. Chapin, General Manager, Johnstown.

7
Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Seven stacks. Six are at Johnstown, and one is at East Conemaugh, two miles from Johnstown. Of the stacks at Johnstown, Nos. 1, 2, 3, and 4 were built in 1853 and 1854; Nos. 1 and 2 were rebuilt in 1883, and are each 76 x 16; Nos. 3 and 4 were rebuilt in 1886, and are each 76 x 16; No. 5, 76 x 19, called also Centennial Furnace, was built in 1873-6, and blown in December 22, 1876; No. 6 is 76 x 19, and was first blown in July 20, 1879. Fuel Connellsville and Conemaugh coke; ores, brown hematite from Blair county, Pa., and red hematite from the Menominee Range, Michigan. Specialty, Bessemer pig iron. The stack at East Conemaugh is 51 x 11½, was built in 1857, rebuilt in 1883, and is now making spiegeleisen from a mixture of foreign and domestic ores. These furnaces are equipped with sixteen Whitwell fire-brick and nine Player iron stoves. Total annual capacity, 325,000 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 355,000 net tons. *See Rolling Mills.*

88 A
Cameron Iron and Coal Company, Emporium, Cameron county. Main office, 5½ Pine st., New York. Building one stack, 75 x 18, to be completed about July, 1888; three Siemens-Cowper fire-brick stoves, each 70 x 18; fuel, coke; ores, local and Lake Superior; estimated annual capacity, 40,000 net tons. Officers at New York: Nicholas C. Miller,

President; James H. Heverin, Vice-President; George S. Middlebrook, Treasurer. Joseph Hunt, General Manager, at the furnace.

Centre Iron Company, Bellefonte, Centre county. Main office, Bullitt Building, 139 South Fourth street, Philadelphia. One stack, 70 x 15, built in 1887; three hot-blast stoves, 50 x 18; fuel, Connellsville coke; ore, hematite from Centre county; annual capacity, 30,000 net tons. Samuel Dickson, President; B. K. Jamison, Vice-President; Charles A. Harte, Secretary; F. B. Owen, Treasurer. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

Charlotte Furnace Company Limited, Scottdale, Westmoreland county. Pittsburgh office, Room 27, Lewis Building. One stack, 65 x 16½, built in 1872-3, put in blast October 14, 1873; fuel, Connellsville coke; ores, Lake Superior, hematite from Blair and Centre counties, and carbonate from Fayette county; specialty, mill pig iron; annual capacity, 22,000 net tons. Brand, "Charlotte." Edwin Miles, Chairman; George K. Miles, Secretary and Treasurer; Nathaniel Miles, General Manager. Sales agents, Nimick & Co., Pittsburgh.

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks. Furnace No. 1, 77 x 19, built in 1790, rebuilt in 1870, 1876, and 1880; four Whitwell hot-blast stoves, three 50 x 18 and one 50 x 22. Furnace No. 2, 78 x 19, first put in blast in May, 1880; two Whitwell stoves, 60 x 18. Fuel, Connellsville coke; ores, a large percentage of Lake Superior specular mixed with roasted native carbonates, with a small quantity of mill cinder to insure free working; product, mill and foundry pig iron, strong and of dark color; also make some Bessemer pig iron; total annual capacity, 100,000 net tons. Old stack was called "Union." Samuel Dickson, President, and Charles A. Harte, Secretary, Bullitt Building, 139 South Fourth st., Philadelphia. Harry W. Hazard, Treasurer and Superintendent, and Charles H. Kimball, Cashier, Dunbar; L. & R. Wister & Co., general agents, 257 South Fourth st., Philadelphia; A. H. Childs, agent, Pittsburgh.

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Philadelphia office, 218 South Fourth st. One stack, 42 x 9, built in 1867; formerly operated with charcoal, but enlarged in 1879 to be run with coke; ores, local brown hematite, carbonate, and red fossiliferous; product, gray forge pig iron; annual production, 4,400 net tons. See *Greenwood (charcoal) Furnace*. See *Rolling Mills*.

Everett Furnace, Everett, Bedford county. One stack, 75 x 20, built in 1883-4, and first blown in December 9, 1884; three Siemens-Cowper-Cochrane hot-blast stoves; fuel, Broad Top coke; ores, local fossil and hematite; annual capacity, 33,000 net tons. Idle since the failure of the Everett Iron Company.

Fairchance Furnace, Fairchance Furnace Company, Fairchance, Fayette county. One stack, 61 x 12½, built in 1887; fuel, coke; ore, ¼ Lake

Superior, balance native, running 33 per cent.; annual capacity, 12,000 net tons. This furnace has been built adjoining the ore mines and coke ovens, and about $1\frac{1}{2}$ miles from the site of old Fairchance Furnace, built in 1804, and abandoned and dismantled in 1887. J. D. Lyon, President; W. H. DeForest, Jr., Secretary and Treasurer, 466 Broome st., New York; R. L. Martin, General Superintendent, Fairchance, Pa.

Frankstown Furnace, James Pierpoint, lessee, Frankstown, Blair county. One stack, 45×10 , built in 1836, rebuilt in 1872; fuel, coke; ore, Centre county hematite; annual capacity, 8,000 net tons. Main office, Altoona, Pa.

Gap Furnace, Hollidaysburg and Gap Iron Company, Hollidaysburg. Furnace at McKee, Blair county. One stack, $46\frac{1}{2} \times 10$, built in 1840, and remodeled in 1877; fuel, coke; annual capacity, 6,000 net tons. James Denniston, President and Treasurer; Aug. S. Landis, Secretary; J. Hartman, Manager.

Glamorgan Furnaces, Glamorgan Iron Company, 332 Walnut st., Philadelphia. Works at Lewistown, Mifflin county. Two stacks: one, $46 \times 13\frac{1}{2}$, built in 1868; one, $72 \times 16\frac{1}{2}$, built in 1872, and rebuilt in 1884-5; fuel, coke; ores, native fossil and hematite; product, foundry and gray forge pig iron; annual capacity of No. 1 furnace, 9,000 net tons; No. 2 furnace, 25,000-net tons. Brand, "Glamorgan." R. B. Wigton, President; C. B. Wigton, Secretary, Treasurer, and selling agent.

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

Lemont Furnace, R. Hogsett & Co., Lemont Furnace P. O., Fayette county. One stack, 55×16 , built in 1875, first put in blast in January, 1876, and rebuilt in 1885; fuel, coke; ores, native and Lake Superior; product, mill pig iron; annual capacity, 15,000 net tons. Brand, "Lemont." Selling agent, W. E. Beall, Pittsburgh.

Lucy Furnace, John Whitehead, Mount Union, Huntingdon county. Main office, Huntingdon. Formerly called Matilda Furnace. One stack, $42\frac{1}{2} \times 10$, built in 1837, and rebuilt in 1869; remodeled in 1887, and a broad gauge railroad built $2\frac{1}{2}$ miles long; fuel, Latrobe and Connellsville coke; ores, fossil and Juniata Valley hematite; product, gray forge pig iron; annual capacity, 8,000 net tons. John Whitehead, Manager.

Olipphant Furnace, Fayette Coke and Furnace Company, Olipphant Fur-

876
1
nace, Fayette county. Telegraph address, Uniontown or Fairchance. One stack, 55 x 12½, built in 1875-6, and rebuilt in 1886; fuel, coke; ores, local carbonate, Blair county, and Lake Superior; also use some mill cinder; product, mill pig iron; annual capacity, 12,000 net tons. A. W. Bliss, President and Treasurer, Uniontown; A. B. de Saulles, Superintendent, Oliphant Furnace; A. H. Childs, selling agent, Pittsburgh.

Pennsylvania Furnace, Centre Mining Company Limited, Pennsylvania Furnace, Huntingdon county. One stack, 44 x 10½, built in 1813; changed from charcoal to coke in 1881; fuel, Connellsville coke; pipe ore and limestone from furnace property; product, forge pig iron; annual capacity, 10,000 net tons. Charles J. Hillard, Chairman; D. I. Bachman, Secretary and Superintendent; A. H. Childs, Treasurer, 83 Fourth avenue, Pittsburgh.

1-87
2
Powelton Furnaces, Robert Hare Powell's Sons & Co., 419 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, three 70 x 18 Whitwell fire-brick stoves; No. 2, 71 x 17, built in 1886-7, three 60 x 18 Whitwell fire-brick stoves; fuel, Broad Top coke; ores, ⅔ native from the firm's mines and ⅓ Lake Superior; product, No. 1 foundry pig iron; 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 shrinkage of ⅓ inch per foot.

1
Rebecca Furnace, Kittanning Iron Company Limited, Kittanning, Armstrong county. One stack, 65 x 16, first put in blast June 20, 1880; fuel, coke; ores, native and Lake Superior; product, forge and foundry pig iron; annual capacity, 25,000 net tons. Brands, "Kittanning" and "Rebecca." See *Rolling Mills*.

1
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.

7
Rockhill Furnaces, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Office, 320 Walnut street, Philadelphia. Two stacks, each 65 x 17, built in 1875, and blown in January 1, 1876; one stack rebuilt in 1886; fuel, Rockhill coke; ores, ½ soft fossil and ½ hematite from the company's mines and from Spruce creek, Bellefonte, and Virginia; specialty, gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Rockhill." William A. Ingham, President; Edward Roberts, Jr., Vice-President; William Boyd Jacobs, Secretary and Treasurer; Alfred W. Sims, Manager.

Number of bituminous coal or coke furnaces outside of Allegheny county and the Shenango region: 33 completed stacks, and one stack building.

CHARCOAL.

- Berlin Iron Works, Jackson Iron Company, Berwick, Columbia county. Furnace at Glen Iron, Union county. One stack, 35 x 8, built in 1827; abandoned in 1856; revived in July, 1880; cold blast; ores, hematite and fossil; product, car-wheel and malleable pig iron; annual capacity, 4,000 net tons. Idle since 1883.
- Carlisle Iron Works, J. C. Bucher, Boiling Springs, Cumberland county. One stack, 28 x 8½, built in 1798, and rebuilt in 1815; hot blast; water-power; ore, Cumberland county hematite; specialties, neutral forge pig iron and car-wheel iron; annual capacity, 5,000 net tons. Brand, "Carlisle." *See Bloomaries.*
- Carrick Furnace, H. M. North & Co., 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.
- Chestnut Grove Furnace, John C. Long, Mechanicsburg. Furnace at Idaville, Adams county. One stack, 32 x 8½, built in 1830; cold blast; open top; ores, magnetic and hematite from the neighborhood; product, charcoal pig iron, warranted strictly cold blast, for car-wheels, chilled rolls, malleable and steel castings, and for open-hearth steel. Brand, "Chestnut Grove C. B." Annual capacity, 1,600 net tons.
- Cleversburg Furnace, Clever & Sons, Cleversburg. Furnace at Shippensburg, Cumberland county. One stack, 35 x 8, built in 1881, and remodeled in 1882; cold blast; ores, local limestone and hematite; product, car-wheel pig iron; daily capacity, 6 tons. Idle since 1885.
- Cornwall Charcoal Furnace, Cornwall Iron Company Limited, Cornwall, Lebanon county. One stack, 31 x 8, built in 1742; cold blast. W. C. Freeman, Chairman. *See Lower Susquehanna Furnaces.*
- Eagle Furnace, Curtins & Co., Roland, Centre county. One stack, 29 x 8½, built in 1848; the original furnace was built in 1817, half a mile south of the present site; open top, open hearth, and closed tuyere; ore, Nittany Valley brown hematite; cold blast; water-power; annual capacity, 2,200 net tons. All the pig iron made is turned into blooms for rods, shovels, sheet iron, and boiler plate. *See Rolling Mills. See Bloomaries.*
- Falling Spring Furnace, C. Burkhart & Co., Chambersburg, Franklin county. One stack, 40 x 8½, built in 1880, and remodeled in 1883-4; cold or hot blast; ore, local hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Falling Spring." Idle since 1883. For sale or rent.
- Greenwood Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Works at Greenwood, Huntingdon county. Philadelphia office, 218 South Fourth st. One stack, 32 x 9, built in 1864; open top; cold blast; red fossiliferous ore, obtained in the vicinity; pig iron used for car-wheels and chilled rolls; annual capacity, 2,700 net

tons. (One stack, built in 1833, not used since 1882.) *See Emma (coke) Furnace. See Rolling Mills.*

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

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

Hopewell Furnace, James Eichelberger & Co., Hopewell, Bedford county. One stack, 30 x 8½, built in 1800; warm blast; open top; water-power; ores, hematite and fossil; specialty, car-wheel pig iron; annual capacity, 1,600 net tons.

Howard Furnace, Howard Rolling Mill Company, Howard, Centre county. One stack, 31 x 8½, built in 1833; cold blast; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. Idle since 1884. (One stack, built in 1830, torn down in 1883.) *See Rolling Mills. See Bloomaries.*

Isabella Furnace, Joseph D. Potts, Barneston, Chester county. Telegraph address, Barneston, via Glenmoore. Philadelphia office, 234 South Fourth st. One stack, 60 x 7½, built in 1835, and rebuilt in 1864, 1881, and 1886; cold blast; product, car-wheel pig iron, made from magnetic and hematite ores, mined in Lancaster and Chester counties, with a mixture of Spanish and Virginia ores; annual capacity, 5,000 net tons. Brand, "Wyebrooke." William M. Potts, Manager. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

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

Joanna Furnace, L. Heber Smith, Joanna Furnace, Berks county. One stack, 30 x 8, built in 1792 by Potts & Rutter, and rebuilt in 1847; cold blast; water and steam power; open top; ores, local magnetic and hematite; specialty, car-wheel pig iron; annual capacity, 1,200 net tons. Brand, "Joanna."

Maiden Creek Furnace, Jacob K. Spang, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold blast; open top; ores, Moselem

hematite and local magnetic; product, pig iron for car-wheels and chilled rolls; annual capacity, 2,500 net tons. Brand, "Maiden Creek."

Mont Alto Furnace, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph connection with Western Union office at Chambersburg. One stack, 45 x 9½, built in 1807-8, and height increased in 1881; cold and warm blast; ore, exclusively neutral brown hematite, from the furnace property; product, pig iron for car-wheels, chilled rolls, and blooms; annual capacity, 10,000 net tons. Brand, "Mont Alto." George B. Wiestling, Superintendent. *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, procured on the furnace property; product, forge pig iron, for flange and fire-box iron; annual capacity, 6,000 net tons. The company contemplates erecting a large anthracite and coke furnace adjacent to present stack, with an annual capacity of 20,000 net tons. J. C. Fuller, President; W. H. Woodward, Treasurer; Daniel King, Superintendent. *See Bloomaries.*

Windsor Furnace, Daniel B. Fisher, Leesport, Berks county. One stack, 28 x 9, built about 1830; cold blast; open top; water and steam power; ores, mainly native hematite, with some New Jersey magnetic; annual capacity, 2,000 net tons. Idle since 1883.

Number of charcoal furnaces in Pennsylvania: 20 stacks. Total number of furnaces in Pennsylvania: 242 completed stacks, and one stack building.

MARYLAND.

MIXED ANTHRACITE AND COKE.

Cedar Point Anthracite Furnace, Baltimore Iron Company, Baltimore. One stack, 44 x 12, built in 1873; Brooke iron hot-blast stove; fuel, anthracite coal and coke; ores, Baltimore county, Spanish, and Irish; product, foundry, forge, and Bessemer pig iron; annual capacity, 6,000 net tons. Horace L. Brooke, President and Treasurer; G. W. P. Coates, Secretary. Idle since 1885. *See Charcoal Furnaces.*

Pennsylvania Steel Company, 208 South Fourth st., Philadelphia. Three completed stacks and two stacks building. Ashland Furnaces, at Ashland, Baltimore county, leased from the Ashland Iron Company, three stacks: No. 1, 32 x 12, built in 1844; No. 2, 32 x 12, built in 1844; No. 3, 53 x 15, built in 1870, and blown in in 1871; Nos. 1 and 2 are blown by steam and water power, No. 3 by steam; fuel, anthracite coal and coke; ores, foreign, from Spain, Africa, and Cuba; product, Bessemer pig iron; total annual capacity, 25,000 net tons. Walter S. Franklin, Manager, and also the Secretary of the Ashland Iron Company. The two stacks building are at Sparrow's Point, a few miles below Balti-

more; each furnace will be 85 x 22; 8 Whitwell fire-brick stoves; ore, foreign; product, Bessemer pig iron. *See Lower Susquehanna Furnaces, Pennsylvania. See Rolling Mills in Pennsylvania.*

Number of mixed anthracite and coke furnaces in Maryland: 4 completed stacks, and 2 stacks building.

COKE.

Antietam Iron Works, P. A. Ahl & Brother, Sharpsburgh, Washington county. Main office, Newville, Cumberland county, Pa. One stack, 50 x 11, built in 1845; water-power; fuel, coke; ore, brown hematite, from the vicinity of Harper's Ferry; product, principally No. 2 and No. 3 mill pig iron. Brand, "Antietam." Theodore Hoover, Superintendent. This is the third stack built on this site; the first one was built about 1775. Idle since 1883.

Catoctin 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." John Kunkel, President; John K. Wilson, Vice-President; Charles E. Kunkel, Secretary; Steiner Schley, Treasurer; Wm. P. Kunkel, General Manager. *See Charcoal Furnaces.* Number of coke furnaces in Maryland: 2 stacks.

CHARCOAL.

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

Cedar Point Charcoal Furnace, Baltimore Iron Company, Baltimore, Baltimore county. One stack, 40 x 9½, built in 1843; hot blast; closed top; ore, exclusively from Baltimore county, most of it being a carbonate; charcoal made in retorts; product, car-wheel and malleable pig iron; annual capacity, 4,500 net tons. Idle since 1884. *See Anthracite Furnaces.*

Chesapeake Furnace, Baltimore Chrome Works Company, Canton, Baltimore. One stack, 32 x 8½, built in 1846, and remodeled in 1882; warm blast; ore, Baltimore carbonate; specialty, car-wheel pig iron; annual capacity, 4,000 net tons. (Another stack, 32 x 8, built in 1853, dismantled in 1883.) Jesse Tyson, President. Idle.

Laurel Furnace, D. M. Reese & Sons, Locust Point, Baltimore. One stack, 50 x 9, built in 1846, and rebuilt in 1856, 1873, and 1882; warm blast; ore, Baltimore carbonate; product, car-wheel pig iron; annual capacity, 5,600 net tons. Brand, "Laurel." D. W. Reese, Superintendent; Edward S. Reese, Treasurer. Selling agents, R. C. Hoffman & Co., 23 South Frederick st., Baltimore.

Locust Grove Furnace, Furstenburg & Adler, Rossville, Baltimore county. One stack, 30 x 7½, built in 1849; hot blast; open top; ore mined at the furnace; product, car-wheel and malleable pig iron; annual capacity, 2,600 net tons. Brand, "Locust Grove." Idle since 1883.

Maryland Furnaces, H. William Ellicott & Sons, Jackson & West sts., Baltimore. Two stacks, 50 x 10 and 50 x 9, built in 1853 and 1870, and rebuilt in 1872 and 1873; moderately warm blast; argillaceous ore, mined near Baltimore; specialty, car-wheel and malleable pig iron; total annual capacity, 12,000 net tons. Brand, "Maryland." H. W. Ellicott, Jr., Manager.

Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George's county. Telegraph address, Laurel. One stack, 29 x 8½, built in 1847; open top; ore, carbonate, mined in neighborhood, roasted and crushed before using; pig iron used for car-wheels, guns, flange iron, shot and shell; annual capacity, 4,200 net tons. Brand, "Muirkirk." Selling agents, Robinson & Orr, Pittsburgh; William E. Coffin & Co., Boston; Stroud & Co., New York; R. C. Hoffman & Co., Baltimore; and John L. Hogan & Co., Philadelphia.

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

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

Number of charcoal furnaces in Maryland: 12 stacks. Total number of furnaces in Maryland: 18 completed stacks, and 2 stacks building.

VIRGINIA.

COKE.

Callie Furnace, Hileman, Waring & Co., Clifton Forge, Alleghany county. Furnace in Botetourt county. One stack, 48 x 12, built in 1873-4 for charcoal, but since enlarged and changed to coke; open top; ore, local hematite; product, mill pig iron. Brand, "Callie." O. Hileman, Superintendent. Idle since 1884.

Crozer Furnace, Crozer Steel and Iron Company; offices at Roanoke, Roanoke county, Va., and Upland, Delaware county, Pa. One stack, 70 x 16, built in 1882-3, and first put in operation May 29, 1883; three Whitwell hot-blast stoves; fuel, Pocahontas (Va.) coke; ore, local hematite; annual capacity, 35,000 net tons. Brand, "Crozer." Samuel A. Crozer, President; W. H. H. Robinson, Treasurer; Francis E. Weston, Secretary; D. F. Houston, General Manager.

Gem Furnace, Shenandoah Iron Company, Milnes, Page county. One stack, 70 x 16, built in 1882, and first blown in February 8, 1883; three Whitwell hot-blast stoves; fuel, Connellsville coke; ore, brown hematite, mined on the furnace property; product, foundry pig iron; annual capacity, 30,000 net tons. Brand, "Gem." William Milnes, Jr., President; A. Creveling, Vice-President; James W. Rodgers, Secretary; John Milnes, Treasurer; A. C. Kloman, Superintendent. Selling agents, Hoffman, Parry & Co., 208 South Fourth st., Philadelphia.

Longdale Iron Company, Longdale, Alleghany county. Two stacks: one stack, (Lucy Selina,) 60 x 11, built in 1827, rebuilt in 1873, and raised to 60 feet in 1876; the other stack, 60 x 14, first put in blast in February, 1881; fuel, West Virginia coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Longdale." H. Firmstone, President; J. E. Johnson, Manager. Matthew Addy & Co., Cincinnati. sole sales agents.

Low Moor Furnace, Low Moor Iron Company of Virginia, Low Moor, Alleghany county. Two stacks: one, 74 x 18, built in 1880, and one, (alternate stack,) 80 x 18, built in 1887; four Whitwell fire-brick hot-blast stoves; fuel, New River coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 50,000 net tons. John Means, President; H. M. Bell, Vice-President; John F. Winslow, Chairman Executive Committee; E. A. Low, Treasurer, and A. Aug. Low, Assistant Treasurer, 31 Burling Slip, New York; Henry Merry, General Superintendent. Western sales agent, Thomas A. Mack, Cincinnati.

Lynchburg Furnace, Edward S. Hutter, lessee, Lynchburg, Campbell county. One stack, 60 x 11½, first put in blast in December, 1880, remodeled in 1882, and again in 1884; fuel, Pocahontas (Va.) coke; ores, local brown hematite and magnetic; annual capacity, 14,000 net tons. Furnace owned by the Lynchburg Iron Company, 220 South Third st., Philadelphia.

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

- Pulaski Iron Company, Pulaski City, Pulaski county. Main office, 330 Walnut st., Philadelphia. One stack, 75 x 17, built in 1887, to be blown in in December, 1887; 3 Whitwell stoves; fuel, Pocahontas (Va.) coke; ores, brown hematite and magnetic, from Cripple Creek region, Va., and Cranberry mines, N. C.; product, foundry and Bessemer pig iron; annual capacity, 45,000 net tons. A. J. Dull, President, Harrisburg, Pa.; A. S. Patterson, Secretary and Treasurer, Philadelphia; John S. Kennedy, Superintendent.
- Victoria Furnace, Goshen Bridge, Rockbridge county. One stack, 85 x 20, built in 1882-3, and first put in blast May 1, 1883; three 60 x 25 Siemens-Cowper-Cochrane fire-brick stoves; fuel, New River coke; ore, limonite, mined near the furnace; product, neutral foundry and forge pig iron; annual capacity, 50,000 net tons. Brand, "Victoria." Idle since 1885. The building of a second stack of the same size was begun in 1883, but work upon it has been discontinued.
- Virginia Nail and Iron Works Company, Lynchburg, Campbell county. Building a furnace at Reusen's Station, Richmond and Alleghany Railroad, to be 65 x 12½; water-power; two iron pipe stoves; fuel, West Virginia coke; ore, local hematite; estimated annual capacity, 15,000 net tons. *See Rolling Mills.*
- Number of coke furnaces in Virginia: 11 completed stacks, one unfinished stack, and one stack building.

CHARCOAL.

- Amherst Furnace, executors of the Estate of S. F. Jordan, Snowden, Amherst county. Telegraph address, Loch Lair. One stack, 33 x 9, built in 1863; warm blast; water-power; ore, brown hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. Out of blast since 1884. For sale. Apply to C. F. Jordan, Green Forest P. O., Rockbridge county.
- Cave Hill Furnace, Wytheville, Wythe county. One stack, 47 x 10, built in 1881-2; open top; cold blast; ores, red and brown hematite and magnetic, mined near the furnace; product, car-wheel pig iron; daily capacity, 10 net tons. Owned by S. R. Sayres, Robert Sayres, and George W. Palmer.
- 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, 6 net tons. Selling agents, R. C. Hoffman & Co., Baltimore. J. W. Robinson, part owner and General Manager.
- Columbia-Liberty Iron Company, Columbia Furnace P. O., Shenandoah county. Telegraph address, Edinburg. Philadelphia office, 216 South Fourth st. Two stacks in Shenandoah county. Columbia Furnace, at Columbia Furnace P. O., 32 x 10, built in 1809, and rebuilt in 1829. Liberty Furnace, at Liberty Furnace P. O., 30 x 9½, built in 1821. Both

furnaces are operated with cold blast; ores, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 4,000 net tons. Brand, "Liberty." Samuel G. Merrick, President, and Charles H. Krumbhaar, Treasurer, Philadelphia; W. D. Pollard, Secretary, Columbia Furnace P. O.

Elizabeth Furnace, H. A. Long, lessee, Water Lick, Warren county. Furnace in Powell's Fort, Shenandoah county. Telegraph address, Front Royal. One stack, 35 x 8½, built in 1843, and rebuilt in 1883; hot blast; open top; ore, local fossil; product, forge pig iron; annual capacity, 6,000 net tons. Brand, "Elizabeth." Formerly called Locust Grove Furnace.

Foster's Falls Furnace, Foster's Falls Mining and Manufacturing Company, Foster's Falls, Wythe county. One stack, 35 x 8, built in 1881; open top; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Foster's Falls." M. B. Tate, President; J. W. Robinson, Secretary and Treasurer; J. A. Dyer, Manager. First called New River Furnace and then Pierce Furnace. Sales agents, R. C. Hoffman & Co., Baltimore.

Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. One stack, 42 x 12, built in 1881-2, and first put in blast in March, 1882; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 8,000 net tons. Main office, 49 Cliff st., New York. George H. Seeley, President; Jordan L. Mott, Vice-President; J. T. Pearson, Secretary and Treasurer; Austin Farrell, General Manager, at the works. Arrangements are being made to remodel the furnace for making coke pig iron.

Lobdell Car-wheel Company, Wilmington, Delaware. Three stacks. Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built from 1870 to 1874, and rebuilt in 1882. Walton Furnace, at Max Meadows, Wythe county, 33 x 8½, built in 1872. White Rock Furnace, in Smythe county, five miles from Rural Retreat Station, Wythe county, 38 x 8½, built in 1875, and blown in August 9, 1875. All use cold blast; ore, local brown hematite; total annual capacity, 6,000 net tons. George G. Lobdell, President; William W. Lobdell, Vice-President; George G. Lobdell, Jr., Secretary; P. N. Brennan, Treasurer; J. H. Wissler, Superintendent.

Norma Furnace, Clinch Valley Coal and Iron Company, 147 South Fourth st., Philadelphia. Furnace on Cripple creek, Wythe county. One stack, 41 x 13, built in 1880, and blown in March 1, 1882; cold blast; ores, local red and brown hematite; product, No. 2 foundry pig iron; daily capacity, 15 net tons. Brand, "The Norma Iron Co." Evans R. Dick, President; Charles H. Mellon, 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; product,

car-wheel pig iron for the Car-wheel Iron Company. Richard Wood, President, 400 Chestnut st., Philadelphia. Idle in 1887.

Reed Island Furnace, Reed Island Iron Company, Reed Island, Wythe county. Furnace in Pulaski county. One stack, 33 x 9, first put in blast April 28, 1881; cold blast; open top; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. R. C. Hoffman, President; J. W. Robinson, Secretary and Treasurer; W. R. Tipton, Superintendent. Sales agents, R. C. Hoffman & Co., Baltimore.

Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace, Botetourt county. Telegraph address, Eagle Rock, Virginia. New York office, 45 Exchange Place. One stack, 32 x 10, built in 1869; hot and cold blast; open top; water-power; ore, hematite, mined on the furnace property; product, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Virginia Salisbury." Eugene Kelly, President and Treasurer; W. Plunket, Secretary; H. S. Dakin, Superintendent. Selling agents, Hosford & Fischer, Cincinnati, Ohio. Idle since 1883.

Sinking Creek Iron Works, J. Willcox Brown, Newport, Giles county. Telegraph address, Christiansburg Depot. One stack, 35 x 9½, built in 1873; warm blast; water-power. E. P. Williams, Superintendent. Idle since 1882.

Van Buren Furnace, Dr. Frank King, Van Buren Furnace, Shenandoah county. Telegraph address, Woodstock. One stack, 37½ x 9, built in 1850, rebuilt in 1870; cold blast, but arranged for hot; ore, local hematite; annual capacity, 2,500 net tons. Idle since 1882.

Wythe and Speedwell Mining and Iron Manufacturing Company, Speedwell, Wythe county. Five stacks on Cripple creek, in Wythe county: Beverly Furnace, 33 x 9, built in 1880; Eagle Furnace, 34 x 9, built in 1863, rebuilt in 1881; Raven Cliff Furnace, 29 x 9, built in 1810, rebuilt in 1876; Speedwell Furnace, 32 x 9, built in 1873-4; Wythe Furnace, 25 x 8, built in 1819, and rebuilt in 1873; all cold blast; open tops; ores, Cripple creek red and brown hematite; product, car-wheel pig iron; total annual capacity, 10,000 net tons. J. W. Robinson, President; J. H. Shuff, Secretary, Treasurer, and General Manager; James S. Crockett, General Superintendent. Selling agents, R. C. Hoffman & Co., Baltimore, Md.

Number of charcoal furnaces in Virginia: 22 stacks. Total number of furnaces in Virginia: 33 completed stacks, one unfinished stack, and one stack building.

NORTH CAROLINA.

CHARCOAL.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 237 South Third st. One stack,

50 x 10, built in 1883-4, and first put in blast April 16, 1884; hot and cold blast; ore, magnetic, mined on the property; annual capacity, 6,000 net tons. Brand, "Cranberry." A. Pardee, Jr., President; J. S. Wise, Secretary and Treasurer; C. H. Nimson, General Manager.

Rehoboth Furnace, J. E. Reinhardt, Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810; cold blast; water-power; ore, magnetic; annual capacity, 1,200 net tons. Idle since 1883. Property for sale. Number of furnaces in North Carolina: 2 charcoal stacks.

GEORGIA.

COKE.

Cherokee Iron Works, Cherokee Iron Company, Cedartown, Polk county. One stack, 60 x 13, 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, of New York, Treasurer; J. R. Barber, Secretary. Selling agents, George H. Hull & Co., Louisville, Ky.

Rising Fawn Furnace, Walker Iron and Coal Company, Rising Fawn, Dade county. One stack, 63 x 16, built in 1873-5, put in blast June 18, 1875; five Whitwell hot-blast stoves; ore, fossiliferous, mined near the furnace; product, foundry pig iron; annual capacity, 40,000 net tons. Brand, "Rising Fawn." Joseph E. Brown, President, Atlanta; Julius L. Brown, Vice-President and Secretary, Atlanta; Louis S. Colyar, Treasurer and General Manager, Rising Fawn. Selling agents, Matthew Addy & Co., Cincinnati.

Number of coke furnaces in Georgia: 2 stacks.

CHARCOAL.

Etna Furnace, Etna Furnace Company, lessee, Etna Furnace P. O., Polk county. One stack, 41 x 8, built in 1870; ore, brown hematite, mined on the property; product, strictly cold-blast car-wheel pig iron; annual capacity, 3,600 net tons. Brand, "Etna." John E. Stillwell, Agent. Idle in 1887.

Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located eight miles north of Rome, on Selma Division of East Tennessee, Virginia, and Georgia Railroad. Telegraph address, Hermitage via Plainville. One stack, 60 x 10, built in 1874; product, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Hermitage." Edward Nichols, President and General Manager. Idle since 1884.

Number of charcoal furnaces in Georgia: 2 stacks. Total number of furnaces in Georgia: 4 stacks.

ALABAMA.

COKE.

- Alice Furnaces, Tennessee Coal, Iron, and Railroad Company, Birmingham, Jefferson county. Main office, Nashville, Tenn. Two stacks: No. 1, 63 x 15, built in 1879-80, and put in blast November 23, 1880; two Gordon-Whitwell-Cowper fire-brick hot-blast stoves; No. 2, 75 x 18, built in 1883, and put in blast July 24, 1883; three Whitwell fire-brick stoves; ores, brown and red hematite and limonite, from the company's mines at Hillman and Redding; specialties, best grade of coke foundry and mill pig iron; total annual capacity, 60,000 net tons. Brand, "Alice." J. A. Stratton, Cashier of Birmingham Division. *See Ensley Furnaces. See Furnaces in Tennessee for list of officers.*
- Bibb Furnace, Brierfield Iron and Coal Company, Brierfield, Bibb county. One stack, 50 x 12, built in 1864 to use charcoal, rebuilt in 1881, and remodeled in 1886 to use coke; ore, brown hematite, mined in the vicinity; annual capacity, 14,000 net tons. *See Rolling Mills.*
- Birmingham Furnace and Manufacturing Company, Trussville, Jefferson county. Building one stack, 65 x 17½, to have a daily capacity of 100 net tons. Robert Hogsett, President, J. M. Thompson, Vice-President, and J. K. Ewing, Treasurer, all at Uniontown, Pa.; R. D. Smith, Secretary, Birmingham; Fuller Hogsett, Superintendent, Trussville.
- DeBardeleben Coal and Iron Company, Birmingham, Jefferson county. Furnaces at Bessemer, 4 miles from Birmingham. Two stacks: Nos. 1 and 2, each 75 x 17, built in 1886-7; 7 Whitwell fire-brick stoves. H. F. DeBardeleben, President and General Manager; Andrew M. Adger, Secretary and Treasurer.
- Edwards Iron Company, Woodstock, Bibb county. One stack, 65 x 13½, first blown in June 10, 1880; remodeled in 1887; ore, local brown hematite; product, foundry and mill pig iron; annual capacity, 24,000 net tons. Giles Edwards, President; T. L. Gilmer, Secretary; T. J. Edwards, Superintendent.
- Ensley Furnaces, Tennessee Coal, Iron, and Railroad Company, Pratt Mines P. O., Jefferson county. Main office, Nashville, Tenn. Building four stacks, each 80 x 20, two to be completed and blown in about January 1, 1888, and the other two to be completed by April, 1888; 4 Gordon-Whitwell-Cowper fire-brick hot-blast stoves to each furnace; fuel, coke, made in the company's ovens; ores, hard and soft red fossiliferous, obtained from the company's mines 6 miles from the furnaces. H. W. Hargreaves, Superintendent of Ensley Division. *See Alice Furnaces. See Furnaces in Tennessee for list of officers.*
- Eureka Company, Oxmoor, Jefferson county. Two stacks: No. 1, 65 x 16, completed in July, 1877, and rebuilt and blown in in December, 1885; No. 2, 70 x 17, first blown in in March, 1876, and rebuilt and blown in in August, 1886; fuel, coke; ore, red fossiliferous; total an-

- nual capacity, 60,000 net tons. D. J. Fallis, President ; J. T. Fallis, Secretary and Treasurer, Cincinnati, Ohio.
- Gadsden-Alabama Iron Company, Gadsden, Etowah county. Building one stack, 75 x 15, to be completed early in 1888 ; 3 Whitwell stoves. L. S. Colyar, President and Treasurer ; H. Woodward, Secretary ; John Dowling, Manager.
- Lady Ensley Furnace Company, Sheffield, Colbert county. Building one stack, 75 x 17, to be completed in 1888 ; 3 Whitwell fire-brick stoves. A. M. Shook, President ; Edward Doud, Secretary and Superintendent ; C. D. Woodson, Treasurer.
- Mary Pratt Furnace, Mary Pratt Furnace Company, Birmingham, Jefferson county. One stack, 55 x 12, built in 1882, and first put in blast in April, 1883 ; 3 Whitwell hot-blast stoves ; hot or cold blast ; fuel, either charcoal or coke, according to the requirements of the iron market ; ore, brown and red fossiliferous, mined within 8 miles of the furnace ; annual capacity, 15,000 net tons. Brand, " Mary Pratt." W. T. Underwood, President and General Manager ; J. H. Edwards, Secretary and Treasurer.
- Pioneer Mining and Manufacturing Company, Birmingham. Building one stack, 75 x 17, to be completed in 1888. Samuel Thomas, President, and George H. Meyers, Secretary and Treasurer, Catasauqua, Pa.
- Sheffield and Birmingham Coal, Iron, and Railway Company, Sheffield, Colbert county. Main office, Nashville, Tenn. Building three stacks, each 75 x 18, to be completed during 1888 ; 9 Gordon-Whitwell-Cowper fire-brick stoves. E. W. Cole, President, and W. S. Jones, Secretary, Nashville ; A. Parrish, Philadelphia, Pa., and H. B. Tompkins, Atlanta, Ga., Vice-Presidents ; C. D. Woodson, Treasurer, J. G. Chamberlain, General Manager, and Edward Doud, Superintendent of furnaces, Sheffield.
- Sheffield Furnace Company, Sheffield, Colbert county. Building one stack, 75 x 17, to be completed early in 1888 ; three Whitwell fire-brick stoves, each 50 x 18. Horace Ware, President, Birmingham ; O. O. Nelson, Vice-President, and Henry C. Moses, Secretary and Treasurer, Montgomery.
- Sloss Furnaces, Sloss Iron and Steel Company, Birmingham, Jefferson county. Two stacks : No. 1, 65 x 16, built in 1881-2, and put in blast April 12, 1882 ; No. 2, 75 x 17, built in 1882 ; six Whitwell hot-blast stoves ; ores mined on the company's property in Central Alabama ; product, foundry and mill pig iron ; annual capacity, 60,000 net tons. Building two stacks, Nos. 3 and 4, each 75 x 17, to be completed early in 1888 ; 8 Gordon-Whitwell-Cowper fire-brick stoves, each 65 x 17 ; daily capacity of each furnace, 140 net tons. Joseph F. Johnston, President ; J. W. Sloss, Vice-President ; Kenneth Robertson, General Manager ; J. P. Williams, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati ; H. W. Adams & 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; closed top; 3 iron-pipe hot-blast stoves; fuel, coke, made at Coalburg; ores, red fossil and brown hematite; product, foundry and mill pig iron; annual capacity, 15,000 net tons. Brand, "Williamson." C. P. Williamson, President and Manager; J. B. Simpson, Secretary and Treasurer; H. D. Williamson, Assistant Superintendent. Selling agents, Matthew Addy & Co., Cincinnati, Ohio; George S. Moore, Louisville, Ky.

W. B. Wood Furnace Company, Florence, Lauderdale county. Foundations started for one stack, 75 x 18. W. B. Wood, President; J. B. White, Secretary; C. D. Woodson, Treasurer; John M. Norton, Superintendent.

Woodstock Furnaces, Woodstock Iron Company, Anniston, Calhoun county. Building two stacks, each 75 x 16, to be completed about March 1, 1888; 6 Whitwell hot-blast stoves, each 60 x 18; estimated total weekly capacity, 2,200 net tons; fuel, coke; ore, local brown hematite and fossiliferous. *See Woodstock (charcoal) Furnaces.*

Woodward Iron Company, Woodward, Jefferson county. Telegraph address, Birmingham. Two stacks, each 75 x 17, one built in 1882-3, and put in blast in August, 1883, and the other built in 1886; the first stack has 3 Whitwell hot-blast stoves, each 70 x 18; the second stack has 4 iron stoves; fuel, coke, made from the company's coal; ores, brown hematite, blackband, and red fossil, mined within three miles of the furnace; specialty, foundry pig iron; total annual capacity, 60,000 net tons. Brand, "Woodward." J. H. Woodward, President; Justus Collins, Secretary and Treasurer.

Number of coke furnaces in Alabama: 14 completed stacks, and 17 stacks building.

CHARCOAL.

Clifton Furnace, Clifton Iron Company, Jenifer, Talladega county. Telegraph address, Alabama Furnace. Two stacks: one, 55 x 10, built in 1873, located at Jenifer; the other, 55 x 12, completed and first blown in April 16, 1885, located at Ironaton, nine miles southwest of Jenifer; hot blast; ore, local brown hematite; product, strictly neutral car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Clifton." Samuel Noble, President; John E. Ware, Secretary and Treasurer; Stephen N. Noble, Superintendent. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & Co., Boston.

Decatur Land, Improvement, and Furnace Company, Decatur, Morgan county. Building one stack, 60 x 12, to be completed in the spring of 1888. E. C. Gordon, President; H. G. Bond, General Manager; W. E. Forest, Secretary; W. W. Littlejohn, Treasurer.

Gadsden Furnace, Gadsden Iron Company, Gadsden, Etowah county. One stack, 64 x 12, built in 1882 with material formerly composing the

Vigo Iron Company's No. 1 furnace at Terre Haute, Ind.; first blown in May 30, 1883; hot blast; ore, local hard and soft red hematite; product, foundry and car-wheel pig iron; annual capacity, 7,200 net tons. Brand, "Gadsden." Formerly called Coosa Furnace. A. J. Crawford, President, Terre Haute, Indiana; R. P. Gobin, Secretary, Treasurer, and General Manager. Selling agents, George H. Hull & Co., and Hall Brothers & Co., Louisville.

Montgomery Furnace, Montgomery Furnace and Chemical Company, Montgomery, Montgomery county. Building one stack, 60 x 12, to be completed in 1888. W. L. Chambers, President; J. A. Woolfolk, Secretary and Treasurer; Dennis Church, Superintendent.

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

Round Mountain Iron Works, The Elliott Pig Iron Company, Gadsden. Furnace at Round Mountain, Cherokee county. One stack, 45 x 8½, built in 1853, rebuilt in 1874; cold blast; ore, red fossiliferous; specialty, car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Round Mountain." The furnace will be remodeled in January, 1888, and will then have a daily capacity of 30 net tons.

Shelby Furnaces, Shelby Iron Company, Shelby Iron Works P. O., Shelby county. Telegraph address, Columbiana. Telephone connection from the works with express office and railroad station. Two stacks, 56 x 12 and 60 x 14, built in 1863 and 1873, respectively; warm blast; ore, brown hematite, obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 25,000 net tons. Brand, "Shelby." Newton Case, President and Treasurer, Hartford, Conn.; H. R. Stoughton, 2d Vice-President and General Manager; O. D. Case, Secretary and selling agent, 13 Johnston Building, Cincinnati; Moses Lyman, selling agent East, Waverly, N. Y.

Tecumseh Furnace, Tecumseh Iron Company, Tecumseh, Cherokee county. One stack, 60 x 12, built in 1873, and put in blast February 19, 1874; hot blast; ore, local brown hematite; product, foundry, mill, and car-wheel irons; annual capacity, 15,000 net tons. Brand, "Tecumseh." Willard Warner, President and General Manager; A. E. Buck, Secretary and Treasurer; W. C. Amos, Superintendent. Selling agent, P. B. Warner, Johnston Building, Cincinnati.

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

Tyler, President; Samuel Noble, Vice-President and General Manager; F. M. Hight, Secretary and Treasurer; C. M. Noble, Superintendent. Selling agents, Matthew Addy & Co., Cincinnati and St. Louis; George H. Hull & Co., Louisville; C. L. Peirson & Co., Boston; Warren, Wood & Co., New York. *See Woodstock (coke) Furnaces.*

Number of charcoal furnaces in Alabama: 10 completed stacks, and 2 stacks building. Total number of furnaces in Alabama: 24 completed stacks, and 19 stacks building.

PROJECTED.

At Atalla, a charcoal furnace, by the Atalla Iron and Steel Company.

At Florence, three coke furnaces, by the North Alabama Furnace, Foundry, and Land Company.

TEXAS.

CHARCOAL.

Lou-Ellen Furnace, Marshall Car-wheel and Foundry Company, Marshall, Marion county. Furnace at Kellyville, Marion county. One stack, 55 x 9½, built in 1869, rebuilt in 1873-4, 1882, and 1886; cold or warm blast; ore, local brown hematite; product, car-wheel pig iron; daily capacity, 25 net tons. Brand, "Lou-Ellen." Charles Cobb, President, 145 Broadway, New York; Charles Cobb, Jr., Secretary and Treasurer.

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

Number of furnaces in Texas: 2 charcoal stacks.

WEST VIRGINIA.

BITUMINOUS COAL OR COKE.

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

Bettie Furnace, Black Band Iron and Coal Company, E. M. Farnsworth, Receiver, Spring Hill, Kanawha county. One stack, 50 x 10½, built in 1882-3; fuel, raw bituminous coal; ores, local blackband, block, and limonite; daily capacity, 30 net tons. A. M. Wooldredge, Superintendent.

Irondale Furnace, F. Nemegyei, Independence, Preston county. Telegraph address, Newburg, W. Va. New York office, 33 Broadway. One stack, 60 x 13½, built in 1861, and rebuilt in 1886; fuel, coke, manufactured from coal mined on the property; ores, a mixture of half and half limonite and hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 13,000 net tons. Brand, "F. N." A. C. Holy, Manager.

Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1874; fuel, coke; ore, Virginia brown hematite; product, principally foundry pig iron; annual capacity, 12,000 net tons. Brand, "Quinnimont." William Rotch Wister, President, and C. Gilpin, Jr., Secretary and Treasurer, Philadelphia; D. C. Boyce, Manager, at the furnace. Idle since 1884.

Riverside Furnace, Riverside Iron Works, Wheeling, Ohio county. Furnace at Benwood, Marshall county. One stack, 75 x 16, built in 1871-2, first blown in February 14, 1872, and remodeled in 1876; fuel, Connellsville coke; ores, Missouri, Lake Superior, and foreign; product, Bessemer pig iron; annual capacity, 55,000 net tons. Brand, "Riverside." *See Rolling Mills. See Miscellaneous Bituminous Furnaces in Ohio.*

Top Mill Furnace, Wheeling Iron and Nail Company, Wheeling. One stack, 65 x 18, built in 1873-4, first blown in October 3, 1878; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 30,000 net tons. *See Rolling Mills.*

Number of bituminous furnaces in West Virginia: 6 stacks.

CHARCOAL.

Bloomery Furnace, Bloomery Furnace Company, Bloomery P. O., Hampshire county. One stack, 40 x 9, built in 1844, rebuilt in 1880; cold blast; product, car-wheel and mill pig iron; weekly capacity, 60 net tons. Idle since 1880. Property for sale. Inquire of John Birkinbine, 25 North Juniper st., Philadelphia.

Capon Iron Works, J. J. & S. E. Keller, Capon Iron Works P. O., Hardy county. Telegraph address, Woodstock, Virginia. One stack, 32 x 8, built in 1832; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 1,500 net tons. Brand, "Capon." Out of blast *since 1880.

Elk River Furnace, Strange Creek, Braxton county. One stack, 42 x 11½, built in 1874-6; cold blast; ores, mixture of limestone, spathic, and hematite, all mined on the property; product, car-wheel pig iron; annual capacity, 5,000 net tons. M. T. Frame, Wheeling. Out of blast since 1881.

Number of charcoal furnaces in West Virginia: 3 stacks. Total number of furnaces in West Virginia: 9 stacks.

KENTUCKY.

BITUMINOUS COAL OR COKE.

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

Licking Furnace, Swift's Iron and Steel Works, Adam Wagner, Assignee, Newport, Campbell county. One stack, 65 x 16, built in 1859, enlarged in 1869; fuel, Connellsville coke; 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 hot-blast stoves, each 50 x 16; ore, native; fuel, raw coal; product, soft pig iron; annual capacity, 20,000 net tons. Brand, "Norton." Selling agents, Rogers, Brown & Co., Cincinnati. *See Rolling Mills.*

Number of bituminous furnaces in Kentucky: 4 stacks.

CHARCOAL.

Bellefonte Furnace, Means and Russell Iron Company, Ashland, Boyd county. Furnace in Greenup county. One stack, 33 x 10½, built in 1826; hot blast; open top; annual capacity, 3,000 net tons. John Russell, Manager.

Estill Furnace, C. W. Russell, lessee and agent, Furnace P. O., Estill county. Telegraph address, Clay City. One stack, 32 x 10, built in 1831; cold blast; open top; ore, native red hematite; specialty, "Red River C. B." car-wheel pig iron; annual capacity, 3,000 net tons. After March 1, 1888, the post-office address of the furnace will be Red River Iron Works, Estill county. (The above furnace is owned by the Kentucky River Iron Manufacturing Company, which also owns the Fitchburg Furnaces in Estill county, not now in use.)

Hunnewell Furnace, Eastern Kentucky Railway Company, Greenup, Greenup county. Telegraph address, Riverton. Furnace at Hunnewell. One stack, 48½ x 10, built in 1852, and rebuilt in 1870; hot blast; open top; limestone, kidney, and block ores; specialty, foundry pig iron; annual capacity, 6,000 net tons. Brand, "Hunnewell." Nathaniel Thayer, President; H. W. Bates, Vice-President; R. Sullivan, Secretary and Treasurer; C. Whittington, Superintendent.

Number of charcoal furnaces in Kentucky: 3 stacks. Total number of furnaces in Kentucky: 7 stacks.

TENNESSEE.

BITUMINOUS COAL OR COKE.

Chattanooga Iron Company, Chattanooga, Hamilton county. One stack, 61 x 13, completed in 1874, and blown in in September, 1874; rebuilt in 1885; fuel, Dade county (Ga.) coke; ores, native red and brown; specialty, foundry pig iron; annual capacity, 20,000 net tons. Joseph E. Brown, President, Atlanta, Ga.; L. S. Colyar, General Manager and Treasurer, Chattanooga.

Citico Furnace, Citico Furnace Company, Chattanooga, Hamilton county. One stack, 69 x 16, built in 1883, and first put in blast in April, 1884; 3 Whitwell fire-brick hot-blast stoves; fuel, coke, from Soddy and Etna mines; ores, Tennessee and Georgia red and brown hematite; product, forge and foundry pig iron; annual capacity, 30,000 net tons. Brand, "Citico." H. S. Chamberlain, President; D. P. Montague, Secretary.

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

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

Tennessee Coal, Iron, and Railroad Company, Nashville. Three completed stacks, and one stack building. Sewanee A Furnace and South Pittsburg Furnaces No. 1 and No. 2 completed, and No. 3 building. The Sewanee A Furnace, at Cowan, Franklin county, is 65 x 15, first put in blast in June, 1880; three Whitwell stoves. Brand, "Sewanee." The South Pittsburg Furnaces were built by the Southern States Coal, Iron, and Land Company Limited, at South Pittsburg, Marion county; No. 1, 70 x 18, first blown in May 2, 1879; No. 2, 70 x 18, completed in 1881; seven Whitwell hot-blast stoves; No. 3, 75 x 17, building, to be completed in January, 1888; product, foundry pig iron. Brand, "South Pittsburg." Fuel, coke, made in the company's ovens at Tracy City and at Whitwell; ore, chiefly hard red fossiliferous, from the Inman mines of the company near South Pittsburg; annual capacity of Sewanee A Furnace, 30,000 net tons; South Pittsburg Furnaces, Nos. 1 and 2, 80,000 net tons. N. Baxter, Jr., President, Nashville; T. T. Hillman, Vice-President, Birmingham, Ala.; A. M. Shook, General Man-

ager, Tracy City, Tenn.; James Bowron, Secretary and Treasurer, Nashville. J. Lodge, Superintendent South Pittsburg Division; J. A. Short, Superintendent Cowan Division; E. O. Nathurst, Superintendent Tracy City Division. General Sales Agent, J. J. Gray, Cincinnati, Ohio. General Purchasing Agent, S. Kirkpatrick, Nashville. *See Alice Furnaces and Ensley Furnaces, Alabama.*

Number of bituminous coal or coke furnaces in Tennessee: 9 completed stacks, and one stack building.

CHARCOAL.

- Aetna Furnace, Aetna Iron Company, Nashville. Works at Aetna, Hickman county. One stack, 55 x 11, built in 1886, and first put in blast November 13, 1886; hot or cold blast; two Whitwell fire-brick stoves; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 net tons. Brand, "Aetna." James C. Warner, President; G. M. Fogg, Vice-President; Leslie Warner, Secretary and Treasurer; Percy Warner, General Manager; William E. McNeilly, Assistant Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati.
- Bear Spring Furnace, Cumberland Iron Works Company, Nashville. Works in Stewart county. One stack, 38 x 11½, built in 1832, abandoned in 1854, and rebuilt in 1873; open top; cold blast; ore, native brown hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Dover." Wm. W. Berry, President; Joseph Vaulx, Vice-President; Albert W. Harris, Secretary and Treasurer.
- Butler Furnace, R. R. Butler, Mountain City, Johnson county. One stack, 30 x 8, built in 1881, and first blown in in October, 1881; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Butler." Not in blast since 1885.
- Cumberland Furnace, Drouillard Iron Company, Nashville. Works at Cumberland Furnace P. O., Dickson county. One stack, 37 x 9½, built in 1825; hot blast; ore, local brown hematite; specialty, No. 1 foundry pig iron; annual capacity, 4,000 net tons. Brand, "Cumberland." Contemplate erecting a modern furnace of 50 tons' daily capacity. J. P. Drouillard, President; Edgar Jones, Secretary; R. B. Stone, Superintendent. This is the oldest active furnace in Tennessee.
- La Grange Furnace Company, Stribling, Stewart county. General office, Nashville. Telegraph address, Stribling, *via* Danville. One stack, 65 x 12, built in 1832, and rebuilt in 1880 and 1884; hot blast; ore, local brown hematite; specialty, machinery and foundry pig iron; annual capacity, 18,000 net tons. Brand, "La Grange." James C. Warner, President; Archer Brown, Vice-President; Leslie Warner, Secretary and Treasurer; Joseph Warner, General Manager; W. E. McNeilly, Assistant Secretary and Treasurer; D. P. Wrenne, Superintendent, at the works. Selling agents, Rogers, Brown & Co., Cincinnati.

Nashville Iron, Steel, and Charcoal Company, West Nashville. Branch office, Nashville. Building two stacks, each 60 x 12, to be completed in 1888; 4 Gordon-Whitwell-Cowper stoves, each 55 x 16. Willard Warner, President and General Manager; H. M. Pierce, Vice-President; E. P. Copeland, Secretary; M. A. Spurr, Treasurer.

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

Standard Furnace, Standard Charcoal Company, Goodrich, Hickman county. One stack, 45 x 9, first blown in December 23, 1885; hot blast; ore, local brown hematite; product, car-wheel and foundry pig iron; annual capacity, 7,000 net tons. Brand, "Standard." The company also manufactures wood alcohol and compounds for preserving timber. John H. Cowing, President, and John L. Williams, Treasurer, Buffalo, N. Y.; Dennis Church, Superintendent, at the furnace.

Warner Furnace, Warner Iron Company, Nashville. Furnace at Warner, Hickman county. One stack, 55 x 11, first put in blast November 12, 1881; hot or cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "Warner." James C. Warner, President; Leslie Warner, Secretary and Treasurer; Percy Warner, Vice-President and General Manager; William E. McNeilly, Assistant Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati.

Number of charcoal furnaces in Tennessee: 8 completed stacks, and 2 stacks building. Total number of furnaces in Tennessee: 17 completed stacks, and 3 stacks building.

OHIO.

HANGING ROCK—CHARCOAL.

Bloom Furnace, Clare Iron Company, Bloom Switch, Scioto county. Telegraph address, Webster. One stack, 33 x 11, built in 1832, and rebuilt in 1846; 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, 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. Brand, "Buckeye." John D. Davis, Superintendent and Agent; T. J. Williams, Secretary.

- Centre Furnace, Centre Mining and Manufacturing Company, Ironton, Lawrence county. One stack, 40 x 10½, built in 1837; cold and warm blast; open top; ore, native limestone; product, car-wheel and extra strong machinery iron; annual capacity, 5,000 net tons. (Grant Furnace, built in 1869, has been abandoned.) W. D. Kelly, President; Lindsey Kelly, Vice-President and General Manager; O. Richey, Secretary; Joshua Austin, Treasurer.
- Cornelia Furnace, Cornelia Furnace Company, Jackson, Jackson county. One stack, 37 x 10½, built in 1853, and first put in blast in 1854; open top; hot and cold blast; ore, principally local limestone; product, mainly No. 1 and No. 2 foundry and car-wheel pig iron; annual capacity, 4,000 net tons. Hot-blast iron brand, "Cornelia;" cold-blast, "Lincoln." First called Iron Valley Furnace and then Lincoln Furnace. J. M. McGhee, Agent. Selling agents, Matthew Addy & Co., Cincinnati.
- Hamden Furnace, Hamden Furnace Company, Portsmouth, Scioto county. Furnace at Hamden Junction P. O., Vinton county. One stack, 34 x 11, built in 1854; hot blast; open top; limestone ore from furnace lands; product, strong foundry pig iron, especially adapted for machinery; annual capacity, 4,000 net tons. Idle for the past 4 years.
- Hecla Furnace, Hecla Iron and Mining Company, Ironton, Lawrence county. One stone stack, 36 x 10½, built in 1833; cold blast; open top; ores, local siderite and limonite, calcined in two ovens, with wood, after being crushed; product, car-wheel and machinery pig iron; total annual capacity, 3,100 net tons. Stopped on Sundays. Brand, "Hecla." Building in 1887 one iron stack, 52 x 10½, to be completed in 1888. The company owns 13,000 acres of iron, coal, and timber land, adjacent to Ironton, with a tramway two miles to ore mines. John Campbell, President; Henry S. Neal, Vice-President; Charles Campbell, Secretary and Treasurer; M. T. Ridenour, Superintendent. Sales agents, Collord & McKeefrey, Pittsburgh; J. J. McDowell & Co., St. Louis; George S. Moore, Louisville; Bacon & Floto, Cincinnati.
- Howard Furnace, Albert Campbell, Agent, Lyra P. O., Scioto county. One stack, 36 x 10½, built in 1853; open top; hot or cold blast; ores, local yellow kidney, limestone, and red block; product, foundry pig iron; annual capacity, 3,500 net tons. Owned by a syndicate of creditors, of which L. M. Beeman, of Thurman, Ohio, is Trustee.
- Jefferson Furnace, Jefferson Furnace Company, Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854; open top; cold blast; ore, local limestone; product, pig iron suitable for car-wheels and machinery; annual capacity, 3,000 net tons. Joseph J. Jones, Secretary; Eben J. Jones, Treasurer; J. D. Davis, Superintendent. Selling agents, Chamberlain, Wheeler & Co., Columbus, Ohio; Collord & McKeefrey, Pittsburgh.

- Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. Telegraph address, Ironton. One stack, 34 x 10, built in 1834, and rebuilt in 1860; cold blast; open top; ore, native limestone; product, car-wheel pig iron; annual capacity, 4,500 net tons. W. H. Peters, President, Treasurer, and Manager; George Peters, Vice-President; J. F. Peters, Secretary. Idle since 1881.
- Madison Furnace, Clare, Duduit & Co., Rempel, Jackson county. One stack, 37 x 9½, built in 1854; hot blast; open top; ore, native red limestone; product, No. 1 foundry pig iron; annual capacity, 3,500 net tons. Brand, "Madison." J. D. Clare, Agent; F. E. Duduit, Manager. Selling agents, Chamberlain, Wheeler & Co., Columbus.
- Mount Vernon Furnace, George N. Gray & Sons, lessees, Campbell, Lawrence county. Telegraph address, Mount Vernon Furnace. One stack, 32 x 10, built in 1833; open top; ore, native hematite; product, warm-blast car-wheel iron; annual capacity, 3,500 net tons. Brand, "Mt. Vernon."
- Olive and Buckhorn Furnaces, McGugin & Co., Olive Furnace P. O., Lawrence county. Situated on the Dayton, Fort Wayne, and Chicago Railroad. Telegraph address, Ironton. Two stacks. Olive Furnace, 37 x 9½, built in 1846. Buckhorn Furnace, 38 x 10, built in 1833, and rebuilt in 1852. Native limestone ore is used in both furnaces; both have open tops; hot and warm blast; product, foundry and car-wheel pig iron; total annual capacity, 8,000 net tons. Brands, "Buckhorn" and "Olive." W. H. McGugin, Superintendent. Selling agents, Hosford & Fischer, Cincinnati.
- Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 34 x 11, built in 1827, and rebuilt in 1844; open top; hot blast; limestone ore; product, strong foundry pig iron; annual capacity, 5,500 net tons. Brand, "Pine Grove." (Ohio Furnace, in Scioto county, built in 1845, has been abandoned.) Thomas W. Means, President; E. B. Willard, Secretary and Treasurer; A. R. Mackintosh, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; Collord & McKeefrey, Pittsburgh; George S. Moore, Louisville. *See Hanging Rock Bituminous Furnaces.*
- Scioto Furnace, Crawford & Leonard, Scioto Furnace P. O., Scioto county. One stack, 32 x 10½, built in 1844; open top; hot blast; annual capacity, 4,000 net tons. Selling agents, Rogers, Brown & Co., Cincinnati.
- Vesuvius Furnace, Etna Iron Works, owners, Pedro, Lawrence county. Main office, Commercial Gazette Building, Cincinnati. One stack, 32 x 10, built in 1832, rebuilt in 1886; cold blast; open top; ore, native limestone; product, car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Vesuvius." Selling agents, Hosford & Fischer, Cincinnati; J. J. McDowell & Co., St. Louis. *See Hanging Rock Bituminous Furnaces for list of officers.*

Total number of charcoal furnaces in Hanging Rock region of Ohio: 16 completed stacks, and one stack building. The Hanging Rock charcoal furnaces generally stop on Sunday, as do also some of the bituminous furnaces.

HANGING ROCK—BITUMINOUS COAL OR COKE.

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

Eliza Furnace, Eliza Iron Company, lessee, Wellston, Jackson county. One stack, 52 x 13, built in 1877 from material of the abandoned Ophir Furnace, and blown in October 30, 1877; rebuilt in 1881, and remodeled in 1884; fuel, raw coal and coke; limestone ore; product, No. 1 soft foundry pig iron; annual capacity, 8,000 net tons. Brand, "Eliza." O. B. Gould, Jr., President; C. C. Martindill, General Manager; Archer Brown, Secretary; William A. Rogers, Treasurer.

Etna Iron Works, Ironton, Lawrence county. Main office, Commercial Gazette Building, Cincinnati. One completed stack, (Alice,) 86 x 18, first blown in September 13, 1875; four Whitwell hot-blast stoves; fuel, New River coke; ores, Hanging Rock, Lake Superior, Virginia, and Kentucky; product, mostly foundry pig iron; present annual capacity, 26,000 net tons; improvements contemplated which will increase capacity to 32,000 tons. Brand, "Alice." One stack partly finished, (Blanche,) 86 x 18, will be completed to mate the Alice during 1888. A. Pluemer, President and General Manager; S. Bartram Richards, Treasurer; J. William Johnson, Secretary; H. R. Brown, Superintendent. Selling agents, Hosford & Fischer, Cincinnati; J. J. McDowell & Co., St. Louis. *See Hanging Rock Charcoal Furnaces.*

Fulton Furnace, Globe Iron Company, Jackson, Jackson county. One stack, 50 x 12, built in 1868; fuel, $\frac{3}{4}$ raw coal and $\frac{1}{4}$ West Virginia coke; ore, native; annual capacity, 7,000 net tons. E. Crandall, Superintendent.

Hamilton Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 65 x 16, built in 1883, and first blown in in March, 1886; three Whitwell stoves; fuel, Kanawha and Connellsville coke and raw coal; ores, native block and limestone; product, soft foundry pig iron; annual capacity, 15,000 net tons. Brand, "Hamilton." *See Hanging Rock Charcoal Furnaces for list of officers.*

Huron Furnace, Jackson, Jackson county. One stack, 49 x 13, first blown in April 19, 1875; annual capacity, 5,000 net tons. Out of blast since 1884. For sale. Owned by Portsmouth and Jackson First National Banks.

Ironton Furnace, Ironton Furnace Company, lessee, Ironton, Lawrence

- county. One stack, 58 x 16, built in 1873-4; fuel, bituminous coal and West Virginia coke; ores, Hanging Rock limestone, Lake Superior hematite, and Virginia brown hematite; product, foundry pig iron and neutral gray forge for special bars and chains; annual capacity, 15,000 net tons. Brands, "Meta," which is a softener, and "Ironton," which is a strong fluid iron used principally for agricultural castings. E. J. Bird, Jr., President and Manager; George Roetting, Secretary.
- Milton Furnace, Milton Furnace and Coal Company, Wellston, Jackson county. One stack, 60 x 14, built in 1873-4, put in blast June 6, 1874; Whitwell hot-blast 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. H. S. Willard, President and Superintendent; J. E. Ferree, Secretary.
- Sarah Furnace, A. Pluemer, Trustee, Cincinnati. Furnace at Ironton, Lawrence county. One stack, 60 x 14, built in 1877, blown in March 18, 1878, and remodeled in 1886; three Whitwell hot-blast stoves; fuel, New River (W. Va.) coke; ores, native, Virginia, Lake Superior, and Kentucky; product, No. 1 foundry pig iron; annual capacity, 12,000 net tons. Brand, "Sarah." H. R. Brown, Superintendent. Selling agents, Hosford & Fischer, Cincinnati; J. J. McDowell & Co., St. Louis.
- Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, 54 x 14, built in 1866, and rebuilt in 1879; fuel, $\frac{3}{4}$ native raw coal and $\frac{1}{4}$ West Virginia coke; ores, native limonite and block; product, Nos. 1 and 2 silver gray foundry and gray mill irons; annual capacity, 9,000 net tons. Isaac Brown, President; B. Kahn, Secretary; L. V. Brown, Manager. Selling agents, Matthew Addy & Co., Cincinnati; Tod, Stambaugh & Co., Cleveland.
- Tropic Furnace, Tropic Iron Company, Jackson, Jackson county. One stack, 47 x 13, built in 1872-3, and rebuilt in 1879; hot blast; fuel, raw coal; ores, native limestone and block; product, foundry and mill pig iron; annual capacity, 6,000 net tons. H. L. Chapman, President; J. C. Jones, Secretary and Treasurer; Miles Jones, Supt.
- Wellston Furnace, King, Gilbert & Warner, lessees, Columbus. Furnace at Wellston, Jackson county. One stack, 52 x 13, built in 1874-5, remodeled in 1879; local limestone ore; product, neutral foundry pig iron; annual capacity, 7,300 net tons. (One stack, built in 1874-5, abandoned in 1881.) See *Franklin Furnace, Miscellaneous Bituminous*. See *Glasgow Furnace, Hocking Valley*. See *Rolling Mills in Ohio*.
- Number of bituminous furnaces in Hanging Rock region of Ohio: 12 completed stacks, and one partly completed.

MAHONING VALLEY—BITUMINOUS COAL OR COKE.

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

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

Brier Hill Iron and Coal Company, Youngstown, Mahoning county.

Two stacks. Tod Furnace, $66\frac{1}{2} \times 14$, built in 1846, and rebuilt in 1879; product, foundry pig iron. Grace Furnace No. 1, 80×18 , built in 1861, torn down in 1873, and rebuilt in 1882; specialty, Bessemer pig iron. Fuel, coke and block coal; ores, Lake Superior and blackband; total annual capacity, 75,000 net tons. Brands, "Brier Hill" and "Grace." (Grace Furnace No. 2, built in 1861, and Tod Furnace No. 2, built in 1880, were torn down in 1887.) John Stambaugh, President; George Tod, Vice-President; H. H. Stambaugh, Secretary and Treasurer; J. G. Butler, Jr., General Manager. *See Himrod Furnaces.*

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

Girard Furnace, Girard Iron Company, Girard, Trumbull county. One stack, 75×16 , built in 1866, remodeled in 1879, and stack raised in 1884; fuel, Connellsville coke exclusively; ore, Lake Superior; product, mill pig iron; annual capacity, 50,000 net tons. Brand, "Girard." A. M. Byers, sole owner, Pittsburgh; Henry B. Shields, Manager, Girard.

Hannah Furnace, Mahoning Valley Iron Company, Youngstown. One stack, $66\frac{1}{2} \times 16$, first put in blast June 14, 1880; rebuilt since that date; fuel, Connellsville coke and native block coal; ore, Lake Superior; product, mill pig iron, all used in the company's rolling mill; annual capacity, 40,000 net tons. Thomas H. Pollock, Manager. *See Rolling Mills.*

Haselton Iron Works, Andrews Brothers & Co., Haselton, Mahoning county. Branch office at Youngstown. One stack, 75×18 , built in 1867 and rebuilt in 1880; fuel, coke; product, Bessemer, foundry, and mill pig iron from Lake Superior ores, and "American Scotch" pig iron from a blackband ore obtained at Mineral Ridge, 12 miles from the furnace; annual capacity, 36,000 net tons. Brand, "Haselton." (A second stack, $56 \times 13\frac{1}{2}$, built in 1868, not now in use.) *See Rolling Mills.*

Himrod Furnaces, Brier Hill Iron and Coal Company, lessee, Youngstown, Mahoning county. Two stacks, 70×15 and 70×16 , built in 1859 and 1860, and rebuilt in 1876; fuel, coke; ores, Lake Superior; product, Bessemer pig iron; annual capacity, No. 1, 30,000 net tons; No. 2, 35,000 net tons. *See Brier Hill Iron and Coal Company.*

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, principally foundry pig iron. "Hubbard strong foundry" is made of a mixture of Lake Superior specular and magnetic ores; "Hubbard Scotch" is made from $\frac{3}{4}$ Trumbull county blackband ores and $\frac{1}{4}$ Lake Superior ore, and sells in place of Scotch pig iron. Total annual capacity, 73,000 net tons. Will shortly run one furnace on Bessemer pig iron.

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

Thomas Furnace, Thomas Furnace Company, Niles, Trumbull county. One stack, 71 x 16, built in 1870, and enlarged in 1883; fuel, Connellsville coke; ores, Mineral Ridge blackband, mined $2\frac{1}{2}$ miles from the furnace, and Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 35,000 net tons. Brand, "Niles Scotch" for soft foundry. J. R. Thomas, Manager.

Number of bituminous furnaces in the Mahoning valley: 14 stacks.

HOCKING VALLEY—BITUMINOUS COAL OR COKE.

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

Columbus and Hocking Coal and Iron Company, Columbus. Five 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 hot-blast stoves, each 36 x 15. Crafts Furnace, at Greendale, Hocking county, one stack, 58 x 15, first put in blast November 8, 1879; its machinery was formerly used at Kenton Furnace, at Newport, Ky., built in 1869, and dismantled in 1877. Gore

- Furnace, at Gore, Hocking county, one stack, 60 x 13, built in 1876, blown in December 8, 1876. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12½, completed and blown in February 20, 1878; three Whitwell hot-blast stoves. Fuel, raw bituminous coal, obtained from the company's mines near the furnaces; ores, native and Lake Superior; product, foundry pig iron; total annual capacity, 90,000 net tons. Percival Farquhar, President; H. D. Turney, 1st Vice-President; V. Ferguson, 2d Vice-President; Walter Crafts, Treasurer; F. W. Merrick, Secretary.
- Fannie Furnaces, J. C. Hamilton, Trustee, Shawnee, Perry county. Two stacks: No. 1, 47 x 11½, built in 1874-5 at Newark, removed to Shawnee in 1876, and blown in September 15, 1876; No. 2, 65 x 15, first put in blast October 10, 1877; extensive improvements made in 1884 and 1886; fuel, raw bituminous coal; ore, Lake Superior; product, American Scotch foundry pig iron; total annual capacity, 20,000 net tons. Brands, "Fannie" and "Hattie." Jacob H. Opperman, Superintendent; W. L. Rous, Bookkeeper.
- Glasgow Furnace, King, Gilbert & Warner, Columbus. Furnace at Moxahala, Perry county. One stack, 70 x 16½, built in 1877-8, and rebuilt in 1887; fuel, coke; ore, blackband; product, "Glasgow American Scotch" pig iron; annual capacity, 27,000 net tons. W. S. Church, Superintendent. *See Franklin Furnace, Miscellaneous Bituminous. See Wellston Furnace, Hanging Rock Bituminous. See Rolling Mills in Ohio.*
- New York Furnace, New York and Perry Coal and Iron Company, Shawnee, Perry county. One stack, 50 x 14½, built in 1877, and blown in November 10, 1877; fuel, raw coal; ores, native, from the company's property, and Lake Superior; product, No. 1 foundry pig iron; annual capacity, 15,000 net tons. Formerly called Mollie Furnace. Building a second stack, 65 x 15, to be completed in November, 1887; two Gordon-Whitwell-Cowper fire-brick stoves, 55 x 18; daily capacity of furnace when completed, 100 net tons. C. R. Griggs, President; George A. Blood, Vice-President and General Manager; A. Howard Carner, Secretary; F. P. Perkins, Treasurer.
- Ohio and Western Coal and Iron Company, Rooms 49 and 50, Wesley Block, Columbus. Three completed stacks and two partly completed stacks. Helen Furnace, at Orbiston, Hocking county, one stack, 52 x 15, built in 1877, and first blown in in December, 1877. Lee Furnace, at Monday, Hocking county, one stack, 52½ x 14, built in 1877-8, and first blown in in March, 1878. 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 60 x 16, partly completed. Fuel, mainly raw coal, mixed with some coke; ores, native limestone, with some Lake Superior; product, chiefly foundry pig iron. John M. Glidden, President, and W. E. Stowe, Treasurer, Boston, Mass.; Walter P. Warren, General Man-

ager, Troy, N. Y.; James A. Hall, Resident Director; H. C. Stanwood, Assistant Treasurer; J. H. Mullin, Engineer and Superintendent. Number of bituminous furnaces in the Hocking valley: 13 completed stacks, 2 partly completed, and one stack building.

MISCELLANEOUS BITUMINOUS—EASTERN OHIO AND CLEVELAND.

Bellaire Nail Works, Bellaire, Belmont county. One stack, 75 x 16, built in 1873, put in blast September 22, 1873, rebuilt in 1886; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron, consumed in the manufacture of steel for nails; annual capacity, 50,000 net tons. *See Rolling Mills.*

Benwood Iron Works, Wheeling, West Virginia. Furnace at Martin's Ferry, Belmont county, Ohio. One stack, 51 x 14, built in 1866; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 20,000 net tons. *See Rolling Mills in West Virginia.*

Cherry Valley Furnaces, Cherry Valley Iron Works, Leetonia, Columbiana county. Two stacks: No. 1, 55 x 14, built in 1867; and No. 2, 75 x 16, built in 1868, and rebuilt in 1883; fuel, coke and raw coal; ores, native and Lake Superior mixed; specialty, "American Scotch" foundry pig iron; total annual capacity, 33,000 net tons. Brand, "Cherry Valley." Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Rolling Mills.*

Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Five stacks. River Furnaces, two stacks, as follows: Proton Furnace, formerly operated by the Cleveland Iron Company, 60 x 16, built in 1869, and rebuilt in 1878; the second stack, 70 x 17, built near Proton Furnace in 1879, and blown in October 15, 1879. Central Furnaces, two stacks: No. 5 furnace, 75 x 20, built in 1881-2; Whitwell stoves; No. 6 furnace, 80 x 20, built in 1887; four fire-brick stoves. Newburgh Furnace, 65 x 16, built in 1872, and remodeled in 1886. Fuel, raw coal and coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; total annual capacity, 200,000 net tons. (Another furnace at Newburgh, built in 1864, was abandoned and torn down in 1884.) *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 mixture of Lake Superior; product, foundry pig iron; annual capacity, 20,000 net tons. Brand, "Tuscarawas." J. P. Burton, President, Massillon, Ohio; E. M. Davis, Vice-President, Philadelphia; S. W. Croxton, Treasurer and General Manager, Cleveland; O. H. S. Ream, Secretary, Canal Dover. Emma Furnace, Union Rolling Mill Company, Cleveland, Cuyahoga county. One stack, 80 x 18, built in 1872, and remodeled in 1882-3; fuel, Connellsville coke; ore, Lake Superior; product, foundry and forge pig iron; annual capacity, 45,000 net tons. Brand, "Emma."

S. A. Fuller, General Manager. Selling agents, Condit, Fuller & Co.
See Rolling Mills.

Franklin Furnace, King, Gilbert & Warner, lessees, Columbus, Franklin county. One stack, 64 x 16, completed in November, 1873, rebuilt in 1884 and 1886; fuel, coke; ores, Hanging Rock limestone and Lake Superior; product, strong foundry pig iron; annual capacity, 25,000 net tons. Brand, "Franklin." *See Wellston Furnace, Hanging Rock Bituminous.* *See Glasgow Furnace, Hocking Valley.* *See Rolling Mills in Ohio.*

Grafton Furnaces, Grafton Iron Company, Leetonia, Columbiana county. Furnaces at Grafton. Two stacks, 53 x 13 and 53 x 15, built in 1866 and 1872; fuel, coke; ore, Lake Superior; product, foundry and forge pig iron. Office, 97 Water st., Pittsburgh: John Graff, President.

Jefferson Iron Works, Steubenville, Jefferson county. Two stacks: No. 1, 58 x 14½, built in 1863, rebuilt in 1877 and 1886; two Gordon-Whitwell-Cowper fire-brick stoves; No. 2, which was built in 1865, is being remodeled to be the same as No. 1, but only one stack will be operated at a time for the present. Fuel, Connellsville and Steubenville coke; ores, Missouri and Lake Superior; specialty, Bessemer pig iron; annual capacity, 34,000 net tons. Brand, "Jefferson." Pig iron sold by Jefferson Iron Works, or by Nimick & Co. and John B. Heron, Pittsburgh. *See Rolling Mills.*

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

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

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

Number of bituminous coal or coke furnaces in Ohio outside of the Hanging Rock, Mahoning Valley, and Hocking Valley districts: 20 stacks.

NORTHWESTERN—CHARCOAL.

Bertha Furnace, S. Frank Eagle, lessee, Cecil, Paulding county. One stack, $41\frac{1}{2} \times 8\frac{1}{2}$, built in 1865; hot blast; ore, Lake Superior; specialty, car-wheel pig iron; annual capacity, 10,000 net tons. Owners, Graff, Bennett & Co., Pittsburgh, Pa.

Number of charcoal furnaces in Ohio outside of Hanging Rock region: one stack. Total number of furnaces in Ohio: 76 completed stacks, 2 stacks building, and 3 partly completed.

INDIANA.

BITUMINOUS BLOCK COAL.

Brazil Furnace, Central Iron and Steel Company, Brazil, Clay county.

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

Vigo Furnace, Vigo Iron Company, Terre Haute, Vigo county. One stack, 52×12 , built in 1872, and blown in in 1873; fuel, raw coal; ore, Missouri; specialty, forge pig iron; annual capacity, 12,000 net tons. Brand, "Vigo." (The No. 1 furnace, built in 1869, was torn down in 1882 and removed to Alabama.) A. J. Crawford, President; J. P. Crawford, Secretary and Treasurer.

Number of furnaces in Indiana: 2 bituminous stacks.

ILLINOIS.

BITUMINOUS COAL OR COKE.

Big Muddy Furnace, Lewis Iron Company, 322 Pine st., St. Louis, Mo. Furnace at Grand Tower, Jackson county. One stack, 69×17 , built in 1871; weekly capacity, 315 net tons. B. W. Lewis, President; William Spear, Secretary and Treasurer.

Calumet Furnace, Chicago Furnace Company, lessee, Chicago. Works at Cummings, Cook county. One stack, 75×18 , built in 1880; 3 Siemens-Cowper-Cochrane fire-brick stoves; fuel, Connellsville coke; ores, Lake Superior and Menominee; product, foundry and mill pig iron; annual capacity, 50,000 net tons. Brand, "Calumet." Charles Himrod & Co., sales agents, Chicago and Detroit. Furnace owned by the Calumet Iron and Steel Company, First National Bank Building, Chicago.

Joliet Steel Company, Home Insurance Building, Chicago. Two stacks: Ethel Furnaces No. 1 and No. 2, at Joliet, Will county, each 80×20 , built in 1873; No. 1 first put in blast in June, 1880, and No. 2 first put in blast in January, 1882; 3 Gordon improved Whitwell and 3 Siemens-Cowper-Cochrane fire-brick stoves; fuel, Connellsville coke;

ores, Lake Superior and Missouri; product, Bessemer pig iron; total annual capacity, 160,000 net tons. *See Rolling Mills.*

Meier Furnaces, Meier Iron Company, 102 North Main st., St. Louis. Furnaces at Bessemer Station, near East Carondelet, St. Clair county. Two stacks, each 60 x 17, built in 1873-5, but blown in for the first time in 1880; eight Whitwell hot-blast stoves; fuel, coke; ore, Missouri specular and hematite; total annual capacity, 56,000 net tons. Adolphus Meier, President; Theodore G. Meier, Vice-President; E. D. Meier, Secretary; John W. Meier, Treasurer.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Cook county. Six stacks in Illinois. Chicago Furnaces, located at Chicago, on north branch of Chicago river, at the foot of Waubansia avenue, have two stacks, (Nos. 1 and 2,) each 66 x 17, built in 1869. South Chicago Furnaces, located at South Chicago, have four stacks, (Nos. 5, 6, 7, and 8,) each 75 x 21, built in 1880-1, two of which were put in blast in 1881 and two were put in blast in 1882. The Chicago Furnaces have 3 Player iron stoves and 3 brick stoves, and the South Chicago Furnaces have 12 fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity of Chicago Furnaces, 80,000 net tons, and of South Chicago Furnaces, 287,000 net tons. E. C. Potter, Superintendent. *See Wisconsin Furnaces. See Rolling Mills in Illinois and Wisconsin.*

Union (The) Steel Company, 302 First National Bank Building, Chicago. Four stacks. Two, each 72 x 13, built in 1869, and rebuilt in 1885; two Cowper fire-brick stoves. Two, each 74 x 16, built in 1881 and 1882; eight Whitwell stoves. Fuel used by all these furnaces, Connellsville coke; ore, Lake Superior; specialty, Bessemer pig iron. *See Rolling Mills.*

Number of furnaces in Illinois: 16 bituminous stacks.

MISSOURI.

COKE.

Jupiter Iron Works, Western Steel Company, lessee, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873, blown in for the first time in 1880; remodeled in 1887, and three Gordon-Whitwell-Cowper fire-brick stoves added, each 65 x 19; fuel, coke; ores, Iron Mountain and Pilot Knob and about $\frac{1}{2}$ red hematite; annual capacity, 50,000 net tons. Owned by the Jupiter Furnace Company, W. O. Garrison, Secretary. *See Western Steel Company. See Rolling Mills.*

Missouri Furnaces, Missouri Furnace Company, 204 North Third st., St. Louis. Two stacks, each 56 x 15, built in 1870, and remodeled in 1887; two Gordon-Whitwell-Cowper fire-brick stoves added, each 55 x 19; fuel, Connellsville coke; ores, Iron Mountain, Shepherd Mountain, Pilot Knob, and Southwest; product, mainly Bessemer pig iron;

total annual capacity, 40,000 net tons. Brand, "Missouri." Oliver B. Filley, President; Edwin C. Cushman, Vice-President; Charles A. McNair, Secretary.

South St. Louis Iron Company, St. Louis. Two stacks, each 56 x 15, built in 1870 and 1872; fuel, Connellsville coke; specialty, Bessemer pig iron; total annual capacity, 40,000 net tons. E. T. Allen, President, 404 Market st., St. Louis. Furnaces have not been in blast for several years. Property for sale or lease.

Western Steel Company, St. Louis. Works at South St. Louis, formerly called Vulcan Iron Works. Three stacks: two, each 63 x 16, built in 1869; one, 75 x 18, built in 1872, and rebuilt in 1886; first two stacks have iron stoves, while the third has 3 Gordon-Whitwell-Cowper fire-brick stoves; fuel, Connellsville coke; ore, Pilot Knob; product, Bessemer pig iron. *See Jupiter Iron Works. See Rolling Mills.*

Number of coke furnaces in Missouri: 8 stacks.

CHARCOAL.

Midland Furnace, Midland Blast-Furnace Company, Midland, Crawford county. Main office, Turner Building, St. Louis. One stack, 50 x 10, built in 1874-5, blown in April 10, 1875, and rebuilt in 1877; either cold or hot blast; ore, red and brown hematite; product, pig iron for steel purposes; annual capacity, 15,000 net tons. This 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.

Nova Scotia Furnace, Nova Scotia Iron Company, 9 South Third st., St. Louis. Furnace near Salem, Dent county. One stack, 55 x 11, built in 1880-1, and blown in in 1882; hot blast; ore, local red hematite; specialty, foundry and Bessemer pig iron; annual capacity, 15,000 net tons. Frederick Shickle, President; John W. Harrison, Vice-President; E. C. Lackland, Secretary.

Pilot Knob Furnace, St. Louis Ore and Steel Company, E. A. Hitchcock, President, Granite Building, 404 Market st., 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.

Sligo Furnace Company, Sligo, Dent county. General office, 411 Olive st., St. Louis. One stack, 55 x 11, built in 1880, and first put in blast in October, 1880; hot blast; ores, blue specular and red oxide, mined near the furnace; product, Bessemer and foundry pig iron; annual capacity, 15,000 net tons. Brand, "Sligo." H. A. Crawford, President and Treasurer, St. Louis; A. L. Crawford, Vice-President, New Castle, Pa.; E. L. Foote, Secretary and Superintendent, Sligo.

Number of charcoal furnaces in Missouri: 4 stacks. Total number of furnaces in Missouri: 12 stacks.

MICHIGAN.

CHARCOAL.

- Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. One stack, 48 x 8½, first put in blast December 25, 1882; burned May 29, 1883, and rebuilt; hot blast; charcoal supplied by 43 round brick kilns, of an average capacity of 75 cords; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 16,000 net tons. Brand, "Antrim." Furnace formerly called Otis Furnace. Building a new furnace, 48 x 10, to have an annual capacity of 17,000 net tons, and to be completed by the close of 1887. T. J. O'Brien, President; J. M. Barnett, Vice-President; J. C. Holt, Secretary and Treasurer; E. Fitzgerald, General Manager, Mancelona. Sales agents, H. R. Durkee & Co., Chicago; Thomas A. Mack, Cincinnati.
- Bangor Furnace, Spring Lake Iron Company, lessee, Fruitport. Furnace at Bangor, Van Buren county. One stack, 43 x 9½, first blown in October 29, 1872; hot blast; ore, Lake Superior; product, Bessemer, car-wheel, and malleable pig iron; annual capacity, 16,000 net tons. Brand, "Bangor." D. C. Lamoreaux, Superintendent, Bangor. Selling agents, Pickands, Brown & Co., 117 Dearborn st., Chicago. *See Spring Lake Iron Company for list of officers.*
- 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 and Detroit.
- Detroit Iron Furnace Company, Detroit. One stack, 52 x 10½, built in 1870; changed from bituminous coal to charcoal in 1879; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; daily capacity, 56 net tons. Brand, "D. I. F." James McMillan, President; Hugh McMillan, Vice-President and Treasurer; E. C. Wetmore, Secretary; Lee Burt, Manager, Detroit. Selling agents, Charles Himrod & Co., Chicago and Detroit.
- Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim county. Chicago office, 105 La Salle st. One stack, 47 x 10½, first put in blast in July, 1873; hot blast; ore, Lake Superior entirely; specialty, Nos. 3 and 4 pig iron for car-wheels and malleable castings; daily average production, 60 net tons. The charcoal for this furnace is made in ten round and twenty-five rectangular brick kilns, holding, respectively, 50 and 100 cords each; chemical works are connected with them. Brand, "Elk Rapids." N. K. Fairbank, President, and F. H. Head, Vice-President, Chicago; E. S. Noble, Secretary and Treas-

- urer, Elk Rapids; H. H. Noble, General Manager, Elk Rapids. Selling agent, F. H. Head, 59 Wabash avenue, Chicago.
- Eureka Furnaces, Eureka Iron and Steel Works, Detroit. Two stacks at Wyandotte. Furnace No. 1, 50 x 12, built in 1855, and rebuilt in 1884-5. Furnace No. 2, 45 x 9, built in 1863; formerly called Ward Furnace. Both use hot blast; ores, Lake Superior and Menominee; product, car-wheel and malleable pig iron; total annual capacity, 33,000 net tons. John Desmond, Superintendent of furnaces. Selling agents, M. A. Hanna & Co., Cleveland. *See Rolling Mills.*
- Fayette Furnaces, Jackson Iron Company, Cleveland, Ohio. Furnaces at Fayette, Delta county. Two stacks, each 52 x 10, built in 1867 and 1869, rebuilt in 1881; hot blast; ores, Jackson specular and hematite; product, Bessemer, foundry, malleable, and car-wheel pig iron; total annual capacity, 35,000 net tons. Iron is known as "Fayette." The furnaces are 80 miles from the company's mines at Negaunee; built at Fayette owing to the abundance of timber. There are 64 charcoal kilns. Samuel Mitchell, President, Negaunee, Mich.; William Chisholm, Treasurer, George W. Billings, Secretary, Fayette Brown, General Agent, and H. H. Brown, Assistant General Agent, all at Cleveland; William Pinchin, Superintendent, Fayette.
- Frankfort Furnace Company, 32 and 34 Woodward avenue, (with Detroit Stove Works,) Detroit. Furnaces at South Frankfort, Benzie county. Two stacks, each 42 x 9½, built in 1870 and 1873; hot blast; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; total annual capacity, 27,000 net tons. M. B. Mills, President; W. H. Irvine, Secretary. Idle since 1885, and the property for sale.
- Gaylord Iron Company, (successor to Detroit and Lake Superior Iron Manufacturing Company,) Detroit, Wayne county. One stone stack, 40 x 9½, built in 1857, and first put in blast March 16, 1857; warm blast; ores, Lake Superior specular, magnetic, and hematite; the pig iron is specially adapted to malleable castings; annual capacity, 9,000 net tons. Charles A. Kent, President; William H. Barnum, Vice-President; William M. Gaylord, Treasurer and General Manager.
- Gogebic Furnace, Gogebic Furnace Company, lessee, Iron River, Marquette county. Main office, with Rogers, Brown & Co., Cincinnati. One stack, 56 x 11, built in 1885, and first blown in February 2, 1886; ore, Gogebic; product, foundry, car-wheel, and malleable pig iron. Brand, "Gogebic." L. S. Hoyt, President, New Castle, Pa.; John Reis, Vice-President and Furnace Manager, and M. R. Hunt, General Manager, Iron River; Archer Brown, Secretary, and William A. Rogers, Treasurer, Cincinnati. Selling agents, Rogers, Brown & Co., Chicago and Cincinnati.
- 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; ore, Lake Superior; daily capacity, 35 net tons. A. G. Stone, President and Treasurer, and D. E. Stone, Secretary, Cleveland, Ohio.

Martel Furnace Company, St. Ignace, Mackinac county. One stack, 53 x 10½, first put in blast August 15, 1881; two Whitwell fire-brick hot-blast 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. Charcoal is made with Mathieu's retorts; by-products, refined wood alcohol, tar, pitch, acetate of lime, etc. W. R. Davenport, President, Erie, Pa.; William B. Vance, Secretary and Treasurer, St. Ignace; S. D. Mills, Superintendent of chemical works.

Menominee Furnace, Menominee Furnace Company, Menominee, Menominee county. One stack, 45 x 9½, built in 1872-3, blown in in August, 1873; hot blast; ore, Lake Superior; annual capacity, 10,000 net tons. A. B. Meeker, President, 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, 90 and 92 Dearborn st., 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, 20,000 net tons. Brand, "Champion." R. M. Cherrie, President; H. Duvall, Secretary; H. C. Dolph, Treasurer.

Pioneer Furnaces, Iron Cliffs Company, Negaunee, Marquette county. Two stacks: No. 1, 56 x 10, built in 1858; No. 2, 56 x 9, built in 1859; both stacks burned and rebuilt in 1877. Ores, Lake Superior, red specular, and soft hematite; product, malleable and car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Pioneer." John H. Abeel, President; Charles J. Canda, Treasurer, 11 Pine st., New York; A. Maitland, General Manager, Negaunee, Mich.; James Rood, Agent, Chicago.

Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 45 x 10½, built in 1879-80, first blown in March 2, 1880; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual

capacity, 22,000 net tons. Irving M. Bean, President, and Samuel Marshall, Vice-President and Treasurer, Milwaukee; J. C. Ford, Secretary and General Superintendent, Fruitport. *See Bangor Furnace.* Union Iron Company, Jefferson avenue east, Detroit, Wayne county. One stack, 50 x 10½, built in 1871-2, and blown in in July, 1872; warm blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "U. I. Co., Det." Austin Burt, President; Wm. Gerhauser, Secretary, Treasurer, and Manager.

Vulcan Furnace Company, Newberry and McMillan Building, Detroit. Furnace at Newberry, Chippewa county. One stack, 53 x 10½, built in 1882-3, and blown in in May, 1883; four iron hot-blast stoves; water jackets; closed top, with Lee Burt's patent charger; ore, hard and soft Lake Superior; product, car-wheel, malleable, and Bessemer pig iron; annual capacity, 22,000 net tons. Brand, "D. I. F. V." James McMillan, President; John S. Newberry, Vice-President; S. E. Driggs, Secretary; Hugh McMillan, Treasurer; Lee Burt, Manager, Detroit. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Number of charcoal furnaces in Michigan: 25 completed stacks, and one stack building.

MIXED ANTHRACITE AND BITUMINOUS COAL AND COKE.

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

Number of mixed anthracite and bituminous coal and coke furnaces in Michigan: one stack. Total number of furnaces in Michigan: 26 completed stacks, and one stack building.

WISCONSIN.

CHARCOAL.

Appleton Furnace Company, Appleton, Outagamie county. Two stacks, each 40 x 8½, built in 1871 and 1872; open tops; hot blast; water-power; ore, Lake Superior; product, car-wheel and malleable pig iron; total annual capacity, 14,000 net tons. Brand, "Appleton." Augustus Ledyard Smith, President; Henry A. Foster, Vice-President; Henry D. Smith, Secretary, Treasurer, and General Manager.

Ashland Iron and Steel Company, Ashland, Ashland county. Building one stack, 65 x 12½, to be completed in 1888; closed top; two Whitwell hot-blast stoves; ore, Gogebic hematite; product, to be car-wheel and malleable pig iron; estimated annual capacity, 24,000 net tons. A. H. Hinkle, President; W. H. Hinkle, Secretary and Treasurer; J. E. York, General Manager.

Florence Furnace, H. C. Dolph, owner, office, 92 Dearborn st., Chicago. Furnace at Florence, Marinette 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 x 10½, built in 1873-4, and first put in blast in 1883; hot blast; ore, Lake Superior; product, pig iron for foundry, car-wheel, and malleable purposes; annual capacity, 10,000 net tons. Wm. Deering, President; E. A. Hyde, Vice-President; Charles Ford, Secretary; J. F. Forsyth, Treasurer; W. H. Nelson, Supt. Sales agents, Forsyth, Hyde & Co., Chicago. Fond du Lac Iron Co., owner.

Fox River Furnaces, West Depere, Brown county. Two stacks, 38 x 9 and 49 x 10, one built in 1869, the other built in 1872; hot blast; ores, from Lake Superior and Menominee Range; total annual capacity, 18,500 net tons. Owned by Rogers & Co., 90 Dearborn st., Chicago, Ill.

Green Bay and National Furnaces, National Furnace Company, Depere, Brown county. Two stacks. Green Bay Furnace, at Green Bay, 39 x 9, built in 1870, and put in blast in the spring of 1871; hot blast; annual capacity, 9,000 net tons. National Furnace, at Depere, 45 x 10½, built in 1869, and put in blast in February, 1870; hot blast; annual capacity, 13,500 net tons. Ores, Lake Superior, Menominee Range, and Gogebic; product, No. 1 foundry pig iron. Brand, "National." (One stack at Depere, built in 1872, has been abandoned.) Henry D. Smith, President; Eugene Smith, Secretary and General Manager; W. L. Brown, Treasurer. Selling agents, Pickands, Brown & Co., Chicago.

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 July, 1886; two Whitwell stoves, each 60 x 16; ore, local hematite and magnetic; annual capacity, 16,000 net tons. Brand, "Minneapolis." Samuel C. Gale, President; Charles S. Carcins, Vice-President; Charles A. Eaton, Treasurer; Charles F. Fairfield, Secretary; Horace E. Burt, Manager of works.

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

Number of charcoal furnaces in Wisconsin: 10 completed stacks, and one stack building.

COKE.

Bay View Furnaces, North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, 151 Insurance Block, Milwaukee. Works at

- Bay View, Milwaukee county, near Milwaukee. Two stacks, (Nos. 3 and 4,) each 66 x 17, built in 1870 and 1871; fuel, Connellsville coke; ores, $\frac{1}{2}$ Lake Superior and $\frac{1}{2}$ Iron Ridge; product, Bessemer, foundry, and mill pig iron; total annual capacity, 65,000 net tons. Brand, "Bay View." *See Illinois Furnaces. See Illinois and Wisconsin Rolling Mills.*
- Mayville Furnace, Northwestern Iron Company, Mayville, Dodge county. Office, Insurance Building, Broadway, Milwaukee. One stack, 50 x 10, built in 1848 as a charcoal furnace, rebuilt in 1872 and 1884, and being remodeled and enlarged to 67 x 13 in 1887 to use coke; ores, Menominee, Gogebic, and local; product, Bessemer and foundry pig iron; annual capacity, 20,000 net tons. Brand, "Irving." Irving M. Bean, President; James C. Spencer, Vice-President; O. C. F. Ilsley, Secretary and Treasurer; F. L. Barrows, Superintendent. Selling agents, Pickands, Brown & Co., Chicago.
- Minerva Furnace, Milwaukee Furnace Company, Milwaukee. One stack, 55 x 15, built and put in blast in the summer of 1873; annual capacity, 22,000 net tons.
- Number of coke furnaces in Wisconsin: 4 stacks. Total number of furnaces in Wisconsin: 14 completed stacks, and one stack building.

MINNESOTA.

CHARCOAL.

- Duluth Furnace, Duluth Iron Company, Duluth, St. Louis county. One stack, 45 x 10, built in 1872-3, and first put in blast July 12, 1880; hot blast; fuel, charcoal; ores, specular and hematite, from the Vermilion and Gogebic ranges; product is principally used for car-wheels and foundry and machine gearing; estimated annual capacity, 10,000 net tons. Brand, "Duluth." A. H. Wilder, President, St. Paul; C. H. Graves, Vice-President, Duluth; F. Sprague, Secretary and Treasurer, Stillwater; James Seville, General Manager, Duluth. Furnace out of blast in 1886 and 1887.
- Number of furnaces in Minnesota: one charcoal stack.

COLORADO.

COKE.

- Colorado Coal and Iron Company, South Pueblo, Pueblo county. New York office, 41 and 43 Wall st. Two stacks: one, 65 x 15, built in 1880-1, and blown in September 7, 1881; and one, 75 x 17, completed in 1887; seven Siemens-Cowper-Cochrane fire-brick stoves; fuel, coke, produced at the company's coke ovens at El Moro; ores, native magnetic and hematite; annual capacity, 60,000 net tons. *See Rolling Mills.*
- Number of furnaces in Colorado: 2 coke stacks.

CALIFORNIA.

CHARCOAL.

California Iron and Steel Company, Hotaling, Placer county. Office, 329 Market st., San Francisco. One stack, 45 x 10, built in 1879-80, and first blown in April 24, 1881; burned in September, 1882, and rebuilt in 1883; hot blast; fuel, charcoal; ore, magnetic, mined at the furnace; product, foundry and car-wheel pig iron, very strong; annual capacity, 12,000 net tons. Egbert Judson, President; George W. Gibbs, Vice-President; George O. Davis, Secretary; C. B. Morgan, Treasurer; U. Seeley, Jr., Superintendent. Furnace blown out in 1886, not to resume under present organization.

Number of furnaces in California: one charcoal stack.

OREGON.

CHARCOAL.

Oswego Furnace, Oregon Iron and Steel Company, Oswego, Clackamas county. Telegraph address, Portland. One stack, 42 x 10, built in 1866-7, first blown in August 27, 1867, and rebuilt in 1879; open top; hot blast; water-power; fuel, charcoal, made exclusively from fir; ore, 40-per-cent. brown hematite, worked raw; product, No. 1 foundry pig iron; annual capacity, 8,000 net tons. Brand, "Oregon." Foundations laid and all the material on hand for another stack, 60 x 13; iron shell; three Whitwell hot-blast stoves; when it is completed the old stack will be abandoned. Elijah Smith, President, Mills Building, New York; W. S. Ladd, Vice-President, and William M. Ladd, Secretary and Treasurer, Portland; E. W. Crichton, Superintendent, Oswego. Selling agent, S. R. Church, San Francisco.

Number of furnaces in Oregon: one charcoal stack.

WASHINGTON TERRITORY.

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 hot-blast stove; closed top, with patent bell and hopper; fuel, charcoal; ores, bog and magnetic, mined in Jefferson county, and also on Texada Island, British Columbia; product, No. 1 foundry pig iron; annual capacity, 10,000 net tons. Brand, "Texada." John A. Paxton, President; A. Chabot, Vice-President; Charles H. Simpkins, Treasurer; A. Halsey, Secretary; J. L. Smith, Superintendent. Selling agent, C. H. Simpkins, San Francisco.

Number of furnaces in Washington Territory: one charcoal stack.

UNITED STATES.

Total number of furnaces in the United States in November, 1887, which are in blast or not likely to long remain idle: 582 completed stacks, and 30 stacks building. There are 168 completed charcoal furnaces, 200 anthracite or mixed anthracite and coke furnaces, and 214 furnaces using coke or raw bituminous coal chiefly. Of the 30 furnaces under construction, 21 are coke, 2 are anthracite and coke, and 7 are charcoal. There are also 5 furnaces in various parts of the country which have been partly constructed, but on which work has been suspended.

FURNACES RECENTLY ABANDONED OR
LIKELY TO BE LONG INACTIVE.

NOTE.—Some of the furnaces named in this list are supplied with good machinery, and circumstances may at some time favor their revival, but the probabilities are that all the furnaces in this list will long remain inactive.

VERMONT.

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

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

MASSACHUSETTS.

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

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

CONNECTICUT.

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

NEW YORK.

CHARCOAL.

Alpine Furnace, Z. H. Benton, Antwerp, Jefferson county. Furnace at Diana, Lewis county. One stack, built in 1846, and blown in during

1848. Furnace lands comprise 40,000 acres. Not in blast for several years.
- Carthage Furnace, Carthage Iron Company, Carthage, Jefferson county. One stack, built in 1818, and rebuilt in 1881. Burned in 1885.
- Fletcherville Furnace, Witherbees & Fletcher, Mineville, Essex county. Built in 1863-4; abandoned in 1875.
- Fullerville Iron Works, George H. Clarke, Fullerville, St. Lawrence county. One stack, built in 1833. Not in blast for several years.
- Greenwood Furnace, Parrott Iron Company, Greenwood Iron Works, Orange county. Built in 1813. Not in blast since September, 1871.
- Jefferson Iron Company, Antwerp, Jefferson county. Two stacks: Sterlingbush Furnace, at Sterlingbush, Lewis county, built in 1852; Sterlingville Furnace, at Sterlingville, Jefferson county, built in 1866.
- Napanoch Furnace, Napanoch, Ulster county. One stack, built prior to 1854; torn down in 1883.
- Norwich Furnace, Norwich, Chenango county. Built in 1856, and repaired in 1873; abandoned in 1880.
- 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. Fort Edward Furnace, at Fort Edward, Washington county, built in 1853. Both abandoned in 1885.
- Fletcher Furnace, Buffalo, Erie county. One stack, built in 1863. Made its last blast in 1885, and was then dismantled.
- 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 Company, Albany. Two stacks, on Van Rensselaer Island, built in 1871. Formerly called Corning Iron Works. Will not be blown in again unless the price of pig iron advances considerably.
- Niagara River Iron Company, Buffalo. Furnace at Ironton, Niagara county. One stack, built in 1873, but only in blast for a short time. Equipment in good order.
- Poughkeepsie Iron Company, Albert Tower, President and Agent, Poughkeepsie, Dutchess county. Two stacks, built in 1848 and 1854; not in blast since 1886, and probably never will be again unless prices advance considerably.
- Union Iron Works, Union Iron Company of Buffalo, Buffalo, Erie county. Three stacks: No. 1 built in 1861; No. 2 built in 1862; No. 3 built in 1865. Have not been in blast since 1876.

NEW JERSEY.

Oxford Iron Works, Oxford, Warren county. One stack, 36 x 10, built in 1742; not likely to go into blast again.

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

PENNSYLVANIA.

MIXED ANTHRACITE AND COKE.

Allentown Iron Works, Allentown Iron Company, Allentown, Lehigh county. Three stacks, built in 1846 and 1853; abandoned.

Atlas Furnace, Red Run Coal Company, Roaring Branch, Lycoming county. Built in 1854.

Bethlehem Iron Company, Bethlehem, Northampton county. One stack, No. 3 Furnace, built in 1868; not likely to go in blast again.

Chestnut Hill Furnace, Columbia, Lancaster county. One stack, No. 1 Furnace, 34 x 10, built in 1845; abandoned.

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

Donegal Furnace, Benson & Cottrell, 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; demolished.

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

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

Lebanon Furnace, Lebanon, Lebanon county. One stack, 36 x 12, built in 1847; torn down to rebuild, but work on it has been discontinued.

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.

Montour Iron and Steel Company, Danville, Montour county. One stack, 34 x 14, built in 1842; abandoned in 1880.

Stanhope Furnace, Thomas Cooch, Pottsville. Furnace at Pine Grove, Schuylkill county. Built in 1825; not in blast since 1880.

St. Clair Furnace, St. Clair, Schuylkill county. Built in 1845; abandoned in 1880.

William Penn Furnace, D. O. Hitner, William Penn P. O., Montgomery county. One stack, 40 x 12½, built in 1854. Idle, and water-power used for a paper mill. (Two stacks, one built in 1844 and one built in 1845, were purchased by the Pennsylvania Schuylkill Valley Railroad Company in 1883 and torn down.)

BITUMINOUS COAL AND COKE.

- Allegheny Furnace, E. Baker's Heirs, Altoona, Blair county. Built in 1811, rebuilt in 1847. Idle for a number of years.
- Bennington Furnace, Blair Iron and Coal Company, Bennington, Blair county. One stack, built in 1856; abandoned in 1885; torn down.
- Brady's Bend Iron Company, Brady's Bend, Armstrong county. Four stacks, built from 1842 to 1845; dismantled in 1878-9.
- Elizabeth Furnace, Sabbath Rest, Blair county. Built in 1832. Idle for several years.
- Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871-2; torn down in 1872.
- Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, built in 1869, enlarged in 1879.
- Fairchance Furnace, Fairchance, Fayette county. One stack, built in 1804, and rebuilt in 1871; dismantled in 1887.
- Juniata Furnace, James M. Kinkead, Williamsburg, Blair county. One stack, built in 1857.
- Lawrence Furnace, Foltz & Jordan, New Castle, Lawrence county. Built in 1846; fuel, coke and charcoal; abandoned in 1873.
- 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, William Acheson, Monticello, Armstrong county. Built in 1859; abandoned in 1876.
- Pine Creek Furnace, Brown & Mosgrove, 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.
- Sligo Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1845; abandoned in 1873.
- Sophia Furnace, New Castle, Lawrence county. Built in 1872, and rebuilt in 1874; dismantled in 1887.
- Stewardson Furnace, F. B. & A. Laughlin, Mahoning, Armstrong county. One stack, built in 1848-9.
- 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, Harrisburg and Potomac Railroad Company, Newville, Cumberland county. Furnace near Shippensburg.

- 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.
- East Penn Furnace, Estate of John Balliet, Bowmanstown, Carbon county. Built in 1837.
- Forest Iron Works, White Deer Mills, Union county. Built in 1846.
- Franklin Furnace, Hunter & Springer, Edenville, Franklin county. One stack, built in 1828.
- Greenwood Furnace, Greenwood, Huntingdon county. One stack, built in 1833; not in use since 1882.
- Hampton Furnace, E. and G. Brooke Iron Company, Birdsboro, Berks county. One stack, built in 1846, and rebuilt in 1872.
- Hecla Furnace, Milesburg, Centre county. Built in 1820; abandoned in 1864.
- Hope Furnace, Rose Point, Lawrence county. One stack, 28 x 8, built in 1868; cold blast. Not in blast for several years.
- 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 3 miles from original site in 1843; abandoned in 1886.
- Madison Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1836; abandoned in 1874.
- Manada Furnace, Grubbs & Bland, Swatara Station, Dauphin county. Built in 1836; abandoned in 1874.
- Mount Etna Furnace, Samuel Isett, Yellow Springs, Blair county. One stack, built in 1808, and rebuilt in 1850. Not in blast since 1877.
- Mount Hope Furnace, C. B. Grubb, Mount Hope, Lancaster county. One stack, built in 1784.
- Mount Penn Furnace, William M. Kaufman & Co., Reading, Berks county. One stack, built in 1830; abandoned in 1883.
- Niagara Furnace, Haines, Stephenson & Co., 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. Blown out for an indefinite time.
- Rebecca Furnace, Mrs. Elizabeth S. Lytle, 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; has been idle since 1874.

Sarah Ann Smith Furnace, John Smith, Bower's Station, Berks county.
One unfinished stack, 30 x 10½, begun in 1883. Offered for sale or lease.

Springfield Furnace, Estate of John Royer, 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.

York Furnace, in York county. Built in 1830; made its last blast in 1874.

GAS.

Alpha Furnace, Schuylkill Iron Company, Norristown, Montgomery county. One stack, built in 1881 to smelt iron ore with gas fuel.

MARYLAND.

BITUMINOUS COAL AND COKE.

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

Chesapeake Furnace, Canton, Baltimore county. One stack, built in 1853; dismantled in 1883.

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

Green Spring Furnace, J. B. Haines & Co., Green Spring Furnace, Washington county. Telegraph address, Clear Spring. One stack, 35 x 8½, built in 1848, rebuilt in 1865. Idle for many years. Works for sale.

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

CHARCOAL.

Harford Furnace, Harford Furnace P. O., Harford county. One stack, built in 1828. Has been idle since 1878.

La Grange Furnace, Estate of E. S. Rogers, The Rocks P. O., Harford county. One stack, 32 x 7½, built in 1836.

VIRGINIA.

COKE.

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

Buffalo Gap Furnaces, Virginia Iron and Steel Company, Buffalo Gap, Augusta county. Two stacks, built in 1869 and 1873. Not in blast for several years.

Powhatan Furnace, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Furnace in Henrico county, on

the Richmond and Alleghany Railroad, five miles above Richmond. One stack, 50 x 13½, built in 1860, and rebuilt in 1872-3. Formerly called Westham Furnace. Idle since 1876.

CHARCOAL.

Barren Springs Furnace, Passaic Zinc Company, 113 Liberty st., New York. Furnace at Reed Island, Wythe county. Built in 1853.

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

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

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

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

Mine Run Furnace, Powell's Fort Mining Company, Alexandria. Furnace in Shenandoah county. One stack, built in 1872.

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

Panther Gap Furnace, R. H. Bell, Agent, Staunton. Furnace near Goshen, Rockbridge county. One stack, built in 1874.

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

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

NORTH CAROLINA.

CHARCOAL.

American Iron and Steel Company, Lockville, Chatham county. Office with the Lobdell Car-wheel Company, Wilmington, Delaware. Two stacks: Buckhorn Furnace, built in 1873; Endor Furnace, built in 1861-5, remodeled in 1872-3. These furnaces have been idle for a number of years, but they are in condition to go into blast again when railroads are built to convey ore to them.

Madison Furnace, Jonas W. Derr, Lincolnton, Lincoln county. One stack, built in 1810.

Ore Hill Furnace, S. H. Wiley, Salisbury. Works at Ore Hill, Chatham county. One stack, built in 1862. Not in blast since 1873.

GEORGIA.

CHARCOAL.

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

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

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

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

COKE.

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

ALABAMA.

CHARCOAL.

Cornwall Iron Works, Hugh McCulloch, Cedar Bluff, Cherokee county. One stack, built in 1862.

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

Stonewall Iron Works, Rock Run, Cherokee county. One stack, built in 1873.

WEST VIRGINIA.

CHARCOAL.

Gladeville Furnace, Eugene List, Wheeling. Furnace at Gladeville, Preston county. One stack, built in 1872.

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

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

COKE.

Waldorf Furnace, Keyser Brothers & Co., Baltimore. Furnace at Iron-town, Taylor county. One stack, built in 1873.

KENTUCKY.

CHARCOAL.

Bath Furnace, Young's Springs, Bath county. One stack, built in 1839, rebuilt in 1872-3. Owners, Robert H. Carter, N. B. Randolph, E. S. Carter, and W. G. Carter.

Buena Vista Furnace, Means & Co., 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, Joel McKinney, Union Hall, Estill county. One stack, built in 1855.

- Fitchburg Furnaces, Kentucky River Iron Manufacturing Company, Furnace P. O., Estill county. Two stacks, built in 1869; not in blast since 1874.
- Hematite Furnace, Trigg county. Formerly called Centre Furnace. One stack, built in 1852.
- Kenton Furnace, Damarin & Co., Portsmouth, Ohio. Furnace in Greenup county. One stack, built in 1856.
- Laura Furnace, C. Beringer, 106 Fourth avenue, Pittsburgh, Pa. Works at Laura Furnace P. O., Trigg county. One stack, built in 1851.
- Laurel Furnace, Joshua Kelley, Riverton, Greenup county. One stack, built in 1849.
- Mount Savage Furnace, Carter County Mining and Manufacturing Company, Mount Savage, Carter county. One stack, built in 1848.
- Pennsylvania Furnace, in Greenup county. Built in 1848; discontinued in 1881.
- Pine Grove Furnace, Spriggs & Sanders, Quincy, Lewis county. Furnace in Greenup county. One stack, built in 1881.
- Pioneer Furnace, Northup, Cummings & Peck, Louisa, Lawrence county. One stack, built in 1881.
- Raccoon Furnace, Raccoon Mining and Manufacturing Company, 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 Hocking Valley, Ohio, by the Crafts Iron Company.

TENNESSEE.

CHARCOAL.

- Brownsport Furnace, Brownsport Furnace P. O., Decatur county. One stack, built in 1850.
- Carter Furnace, Carter's Furnace P. O., Carter county. Built in 1840; abandoned in 1887.
- Clark Furnace, Stribling, Stewart county. Built in 1854, burned and rebuilt in 1881; abandoned in 1883.
- Dougherty's Furnace, Baker's Gap, Johnson county. Built in 1878; made but a short blast.
- Dover Furnace, in Stewart county. Built in 1828, and rebuilt in 1854. Has been idle for many years.
- Eagle Furnace, Riley Stone, 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, Napier Iron Company, Chief P. O., Lawrence county. One stack, built in 1860.

Pottsdale Furnace, Greeneville, Greene county. Built in 1862; out of blast since 1874.

Rose and Crockett Iron Works, Cumberland Gap, Claiborne county. One stack, built in 1823.

Rough and Ready Iron Works, Rough and Ready Furnace P. O., Stewart county. One stack, built in 1850, rebuilt in 1868.

Speedwell Furnace, Speedwell, Claiborne county. Built in 1825.

Sullivan County Furnace, Jenkins, Hodge & Co., Union Depot, Sullivan county. One stack, built in 1881, but was operated for only a short time.

Unaka Furnace, Unaka, Greene county. Built in 1868; out of blast since 1874.

Vernon Furnace, in Montgomery county. Built in 1833. Has been out of blast for many years.

Wayne Furnace, in Wayne county. Built in 1856; out of blast since 1875.

Worley Furnace, Dickson, Dickson county. Built in 1847; made a blast on coke in 1879.

COKE.

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

OHIO.

CHARCOAL.

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.

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

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

Gallia Furnace, Norton, Campbell & Co., Portsmouth, Scioto county. Furnace in Gallia county. Built in 1847; abandoned in 1883.

Grant Furnace, Ironton, Lawrence county. One stack, built in 1869; dismantled in 1883.

Hope Furnace, Hope Furnace P. O., Vinton county. Formerly called Big Sand Furnace. One stack, built in 1854. Has not been in blast since 1874.

Jackson Furnace, Union Iron Company, Portsmouth, Scioto county. Furnace in Jackson county. Built in 1839.

- Keystone Furnace, Bundy Iron and Coal Company, Keystone Furnace, Jackson county. One stack, built in 1849.
- Latrobe Furnace, Bundy Iron and Coal Company, Berlin X Roads, Jackson county. One stack, built in 1854.
- Logan Furnace, Logan Iron Company, Logan, Hocking county. One stack, built in 1852; abandoned in 1883.
- Manhattan Furnace, Toledo Iron Company, 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, Union Iron Company, Monroe Furnace P. O., Jackson county. One stack, built in 1856.
- Ohio Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. 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, B. C. & R. D. McManigal, Union Furnace P. O., Hocking county. One stack, built in 1853.

BITUMINOUS COAL AND COKE.

- Ashland Furnace, Jonathan Warner, Mineral Ridge, Trumbull county. Built in 1859.
- Eagle Furnace, Eagle Furnace Company, Youngstown, Mahoning county. Built in 1846. Not in blast for a number of years.
- Elizabeth Furnace, Niles, Trumbull county. Built in 1859; demolished.
- 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; torn down in 1887.
- Haselton Furnace, Andrews Brothers & Co., Haselton, Mahoning county. Built in 1868; not now in use.
- Himrod Furnace, Himrod Furnace Company, Youngstown, Mahoning county. Built in 1868; torn down in 1887.
- 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.
- Orange Furnace, Jackson, Jackson county. Built in 1864; out of blast since 1874.

Porter Furnace, Jonathan Warner, Mineral Ridge, Trumbull county. Built in 1860; made its last blast in 1873.

Tod Furnace No. 2, Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Built in 1880; torn down in 1887.

Vinton Furnace, Vinton Coal and Iron Company, Vinton Station, Vinton county. One stack, built in 1854. Has not been in blast for several years.

Volcano Furnace, Volcano Furnace Company, Massillon, Stark county. One stack, built in 1855.

Warren Furnace, Wm. Richards & Sons, Warren, Trumbull county. Built in 1870; burned in 1878.

Washington Furnace, Union Iron Company, Washington Furnace, Lawrence county. One stack, built in 1853.

Wellston Furnace, Wellston, Jackson county. Built in 1874-5; abandoned in 1881.

INDIANA.

BITUMINOUS COAL.

Lafayette Furnace, Otter Creek, Clay county. Built in 1868; torn down in 1879.

Planet Furnace, Indianapolis Rolling Mill Company, Harmony, Clay county. Built in 1867; torn down in 1877.

Vigo Furnace No. 1, Vigo Iron Company, Terre Haute, Vigo county. Built in 1869; removed to Alabama in 1882.

Western Furnaces, Knightsville, Clay county. Two stacks, built in 1867 and 1868; torn down in 1879.

CHARCOAL.

Nelson Furnace, Nelson Fordice, Shoals, Martin county. One stack, built in 1872. Has been out of blast since 1880.

ILLINOIS.

BITUMINOUS COAL OR COKE.

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

MICHIGAN.

CHARCOAL.

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

Carp River Furnace, Marquette. Built in 1872-3; burned in 1882.

Cliffs Furnace, Negaunee, Marquette county. Built in 1867; abandoned.

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

Excelsior Furnace, Carp River Iron Company, Marquette. Furnace at Ishpeming. Built in 1872, rebuilt in 1879. Idle for several years.

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

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

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

Munising Furnace, Munising, Schoolcraft county. Built in 1867.

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

WISCONSIN.

CHARCOAL.

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

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

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

MISSOURI.

CHARCOAL.

Hamilton Furnace, Sullivan, Franklin county. One stack, built in 1873.

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

Iron Mountain Furnaces, in St. Francois county. Two stacks, built in 1846 and 1854; not in blast for several years.

Knotwell Furnace, Newburg, Phelps county. Owned by Richard Heckscher, Philadelphia. One stack, built in 1873-4.

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

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

Osage Furnace, in Camden county. Built in 1873.

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

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.

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. 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, 4 ordinary heating furnaces, one Siemens heating furnace, and 3 trains of rolls (one 10 and two 18-inch); product, merchant bar iron, railroad spikes, and fish-plates; annual capacity, 13,000 net tons. Brands, "Standard" and "Forest City." C. R. Milliken, President; John W. Leavitt, Secretary and Treasurer; Samuel Peters, Superintendent.

Number of rolling mills in Maine: one.

NEW HAMPSHIRE.

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

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

MASSACHUSETTS.

Bay State Iron Works, Bay State Iron Company, 12 Pearl st., Boston, Suffolk county. Works, corner First and I sts., South Boston. Puddle mill built in 1847, containing 16 double puddling furnaces and 2 trains of rolls, not now in running condition. Plate mill No. 1 built in 1863, containing 2 trains of rolls and 5 heating furnaces, not now in running condition. Plate mill No. 2 built in 1873; 2 trains of 30-inch rolls, 5 heating furnaces, and one annealing furnace; product, steel plates, rolled for other parties who furnish the ingots; annual capacity, 8,500 net tons. B. C. Vose, Treasurer and General Manager. Other

- officers: John H. Reed, President; Edward W. Hooper, F. Gordon Dexter, Charles J. Whitmore, and Arthur Wainwright, Directors.
- Boston Car-wheel Company**, corner First and I sts., South Boston. One 7-gross-ton open-hearth steel furnace, first started in March, 1886; product, steel ingots, rolled into plates by the Bay State Iron Company; annual capacity, 3,200 net tons.
- Bridgewater Iron Company**, Bridgewater, Plymouth county. Built in 1785 and 1874; 5 scrap furnaces, 3 heating furnaces, 6 forge fires, 8 trains of rolls, and 10 hammers; product, bar iron, tack plate, sheet zinc and sheet copper, and various kinds of iron and steel forgings; annual product of rolled iron, about 6,000 net tons. Nahum Stetson, Treasurer.
- Cambridge Rolling Mills**, Gilmore & Eustis, lessees, Cambridgeport, Middlesex county. Built in 1868; burned and rebuilt in 1884; 5 heating furnaces and 3 trains of rolls; product, merchant bar and shafting iron to 2½ inches in diameter, axe iron, rerolled Norway and Swedish shapes, bolt, nail, rivet, and wire rods, scrap wire and rivet rods, scrap rods, scrolls, tires, and horse-shoe iron; annual capacity, 10,000 net tons. Stamp for best refined, "B. R. M." Special stamps are used on other kinds of iron. Formerly called Boston Rolling Mills.
- Danvers Iron Works**, Arthur G. Tompkins & Co., 10 Oliver st., Boston. Works at Danversport, Essex county. Built in 1831; burned and rebuilt in 1883; 3 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); product, merchant bar iron, bolt iron, scrap rods, and rerolled Norway and Swedish shapes; annual capacity, 5,000 net tons. Brand, "Danvers."
- East Bridgewater Iron Company**, Rogers & Sheldon, 240 Congress st., Boston. Works at East Bridgewater, Plymouth county. Built in 1837; one double puddling furnace, 6 heating furnaces, 2 charcoal fires, one train of 16-inch rolls, 27 nail machines, and one hammer; steam and water power; product, cut nails, spikes, clinch nails, and tack plate; make a few steel nails; annual capacity, 40,000 kegs of nails and 1,200 net tons of tack plate. W. O. Sheldon, Superintendent.
- Franconia Iron and Steel Works**, James C. Warr, lessee, Wareham, Plymouth county. Built in 1866; 6 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron, of all kinds and sizes; specialties, round, square, and flat iron, angles, ovals, half ovals, half rounds, axle and axe iron, and shafting; daily capacity, 30 net tons.
- Globe Nail Company**, Station A, Boston. Built in 1877; 2 heating furnaces and 2 trains of rolls (one 9 and one 12-inch); use Swedish iron; product, horse-nail plate, tack plate, and other special rolling; annual capacity, 5,000 net tons. Aretas Blood, President; E. H. Baker, Treasurer; W. B. Crocker, Secretary; W. H. H. Miner, Superintendent.

- Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton, Norfolk county. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process; stock company formed in 1855; 4 double puddling and 5 heating furnaces, one busheling and 2 scrap furnaces, 8 hammers, and 3 trains of rolls (one 8, one 14, and one 19-inch); steam and water power; product, merchant bar iron, shapes, splice bars, track bolts, and railroad supplies; annual capacity, single turn, 6,000 net tons. Brands of bar iron, "Kinsley" and "G. K." Forge connected with the works for the production of car and locomotive forgings, wagon axles, etc.; also a foundry and a machine shop. Fred. L. Ames, President; Edw. R. Eager, Treasurer; Frank M. Ames, Agent.
- Mount Hope Iron Works, Mount Hope Iron Company, Somerset, Bristol county. Built in 1875; one single and 6 double puddling furnaces, 12 heating furnaces, 100 nail machines, and two 18-inch trains of rolls; product, nails, tack plate, skelp iron, shovel plate, etc.; annual capacity, 9,000 net tons. Also operate a machine shop for building nail machines and flax and hemp dressing machinery. Job M. Leonard, Treasurer; Henry B. Leonard, Agent.
- Norway Steel and Iron Company, 6 Oliver st., Boston. Works at 363 Dorchester avenue, South Boston. Built in 1854; 2 double and 6 single puddling furnaces, 14 heating furnaces, 10 trains of rolls, (three 8, one 10, one 13, four 18, and one 30-inch,) three 10-gross-ton Siemens-Martin open-hearth steel furnaces, and 3 hammers; steel products, ingots, slabs, blooms, billets, bars, rods, bands, boiler and other plates, machinery, spring, tire, toe-calk, and sleigh-shoe steel, and finished compressed steel shafting; iron products, bars, rods, bands, tack plate, nail plate, strips, and shapes; total annual capacity, 27,000 net tons. Brands, "Benzon," "Vasa," "Malar," "Norway," "N. I. W.," a five-point star, S with a crown over it, and N with a crown over it. George P. King, President; Albert Geiger, Secretary and Treasurer; George H. Billings, Superintendent.
- Old Colony Iron Company, Taunton, Bristol county. Built in 1825, and partially destroyed by fire in 1886; one puddling furnace; 7 heating furnaces, 3 trains of rolls; product, tack and nail plate. O. A. Washburn, Jr., Agent and Treasurer.
- Reed Brothers' Rolling Mill and Tack and Nail Works, D. L. & F. S. Reed, Brockton, Plymouth county. Built in 1881-2 at Matfield, and removed to Brockton in 1886; one double puddling furnace, 4 heating furnaces, one large squeezer, 3 trains of rolls, (one 12, one 16, and one 20-inch,) and 60 cut nail and tack machines; product, tack plate, cut nails, and tacks; annual capacity, 2,000 net tons of tack plate and 27,000 kegs of nails. Building a large heating furnace.
- 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, rebuilt in 1846, Clapp-Griffiths steel plant added in 1887; two 3-ton converters, to be operated in connection with the nail works, and for other purposes; first blow to be made in November, 1887; 5 trains of rolls, (one 24-inch blooming, one 24-inch finishing, two 18-inch nail plate, and one 17-inch tack plate,) and 173 nail machines; steam and water power; annual capacity, 250,000 kegs of cut nails, 10,000 net tons of plates, and 20,000 tons of slabs and billets. Horace P. Tobey, Treasurer.

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

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Two mills. Quinsigamond Rolling Mill, built in 1846; 10 heating furnaces and 3 trains of rolls; product, iron and steel screw, rivet, and wire rods; annual capacity, 30,000 net tons. Steel works added in 1885; one 12-gross-ton Siemens-Martin open-hearth furnace; made first steel September 26, 1885. Grove Mill, built in 1868; 4 heating furnaces and 3 trains of rolls; product, patent continuous wire rods of long lengths and small sizes for telegraph and rope wire; annual capacity, 50,000 net tons. All rods drawn into wire. Philip L. Moen, President and Treasurer; Charles F. Washburn, Vice-President and Secretary.

Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester, erected in 1864; twelve 4-pot steel furnaces, 3 heating furnaces, one train of tire rolls, and one hammer; product, crucible steel car-wheel tires; annual capacity, 1,100 net tons. Brand, "Washburn Car-wheel." William H. Barnum, Acting President and Manager; Salisbury Hyde, Secretary and Treasurer.

Worcester Steel Works, (formerly Washburn Iron Company,) P. O. Box 967, Worcester, Worcester county. Built in 1857, and remodeled in 1882 to roll steel rails. Two 4-gross-ton Bessemer converters built in 1884; first blow made June 2, 1884, and first steel rail June 11, 1884; 2 Siemens heating furnaces, 2 trains of rolls, one hammer, and one 12-gross-ton Siemens-Martin open-hearth steel furnace; first open-hearth steel made March 25, 1885; product, Bessemer steel rails, also wire billets, nail plate, and blooms; annual capacity, 50,000 net tons. The company also makes cast-iron car-wheels; annual capacity, 25,000 wheels. George M. Rice, President; M. J. P. McCafferty, Secretary; Edwin Gleason, Treasurer; Samuel D. Nye, Manager; William E. Colles, General Superintendent.

Number of rolling mills and steel works in Massachusetts: 20. Of these one makes Bessemer steel, one makes Clapp-Griffiths steel, 4 make open-hearth steel, and one makes crucible steel.

RHODE ISLAND.

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

Number of rolling mills in Rhode Island: one.

CONNECTICUT.

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

Bridgeport Rolling Mill Company, Bridgeport, Fairfield county. Built in 1887; one 14-inch train of rolls for rolling slabs from scrap iron. Building an additional 12-inch train of rolls.

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

Farist (The) Steel Company, Bridgeport, Fairfield county. Built in 1868; enlarged since; 2 single puddling and 4 heating furnaces, 2

trains of rolls, (one 12 and one 15-inch,) 6 hammers, one 24-pot Siemens gas steel-melting furnace, and 18 four-pot steel-melting holes; product, cast steel, rolled and hammered; annual capacity, 1,800 net tons. Added in 1883 a spring shop, containing machinery for the manufacture of spiral springs and elliptic railroad springs. Joel Farist, President; George Windsor, Secretary; John B. Windsor, Treasurer.

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

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

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

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

NEW YORK.

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

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

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

Chrome Steel Works, corner Kent Avenue and Keap st., Brooklyn, Kings county. Built in 1869; 7 heating furnaces, 7 hammers, 24 steel-melting holes, and 2 trains of rolls (one 12 and one 18-inch); 96 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.

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 4 Swindell gas heating furnaces, and 4 trains of rolls; water-power; product, band iron, bar iron, and patent punched axe-polls; specialty, high-grade iron for edge tools and butts and hinges; annual capacity, 9,000 net tons.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Mill built originally as a rail mill in 1860; puddle mill built in 1868; rail mill converted into puddle mill in 1883; 24 single and 2 double puddling furnaces, one hammer, and 2 18-inch trains of rolls. Bar mill erected in 1864; 4 heating furnaces and 3 trains of rolls (one 9, one 12, and one 18-inch.) Universal mill, built in 1884 to roll plates from 6 to 30 inches wide and of any thickness, has 2 Siemens heating furnaces, 9 x 12 feet, with a daily capacity of 20 tons. Annual capacity, 20,000 net tons of bar, angle, plate, and band iron. Brand, "Elmira." H. W. Rathbone, President and General Superintendent; J. B. Rathbone, Vice-President; Jesse L. Cooley, Secretary and Treasurer; William Clark, Manager. *See Furnaces.*

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Crucible steel plant erected in 1880; four 5-pot steel-melting holes; annual capacity, 200 net tons of crucible steel castings. Open-hearth steel plant erected in 1882; one 8-gross-ton open-hearth steel furnace; annual capacity, 2,000 net tons of open-hearth steel castings.

Manhattan Rolling Mill, John Leonard, 451 West st., New York City. Built in 1881; 2 heating furnaces and 2 trains of rolls (one 8 and one 18-inch); product, horse-shoe iron and small flats; annual capacity, 2,000 net tons of horse-shoe iron and 600 net tons of flats. Brand, "J. L. H. S. Iron." E. B. Edwards, Manager.

- Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Built in 1862-3; 48 two-pot steel-melting holes, 4 heating furnaces, one train of rolls, and one hammer; product, saw cast steel; annual capacity, 2,500 net tons. George N. Clemson, President; William Millspaugh, Vice-President; R. W. Clemson, Secretary; Charles I. Humphrey, Treasurer.
- Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse, Onondaga county. Built in 1864; 11 heating furnaces, 6 hammers, (from 200 to 2,000 pounds each,) 5 trains of rolls, (two 9, one 10, and two 12-inch,) and 5 steel-cementing furnaces; manipulators of old Bessemer steel rails and locomotive tires, and converters of iron into blister steel; product, bar steel, steel crow-bars, seat springs, tire and spring steel, and steel for various other purposes; annual capacity, 8,000 net tons. Wire nail department added in 1887; 20 nail machines completed and several more building; annual capacity, 2,500 net tons. Special products, "Sweet's Excelsior" tire steel, "Sweet's" seat springs, and "Sweet's" steel crow-bars. William A. Sweet, President and Manager; Matthew Cunningham, Secretary; A. A. Sweet, Treasurer; Peter Eckel, Superintendent. Agents, Parkhurst & Wilkinson, Chicago.
- Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 3 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one hammer; use scrap iron and steel billets; product, merchant bar of all sizes and shapes, used by the firm in the manufacture of agricultural machinery; annual capacity, 4,500 net tons. T. M. Osborne, President; J. H. Osborne, Secretary; G. W. Allen, Treasurer.
- Phoenix Horse Shoe Company, Poughkeepsie. New York office, 20 Reade st. Built in 1873; 6 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; specialty, horse shoes; annual capacity, 8,000 net tons. Charles Miller, President and Manager; Charles H. Holton, Secretary and Treasurer.
- Rome Merchant-Iron Mill, Rome, Oneida county. Built in 1869; 8 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best grades of merchant bar, horse-shoe, hexagon and beveled-edge tire, scroll, hoop, and band iron, branded "Rome," and a superior quality from charcoal pig branded "J. G.;" annual capacity, 10,000 net tons. Jim Stevens, President; C. S. Griffin, Vice-President; Charles W. Lee, Secretary and Treasurer; Samuel Southall, Superintendent; Jay Hildreth, Agent.
- Sable Iron Works, J. and J. Rogers Iron Company, Ausable Forks, Essex county. Built in 1834; operated in connection with a forge; 2 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); water-power; product, bars for conversion into cast steel, Peru horse-shoe iron, and round and square iron; annual capacity, 7,000 net tons. Brands, "Peru iron," "Rogers," or R in a circle. H. D. Graves, Presi-

dent; H. W. Stetson, Vice-President; Benjamin E. Wells, Secretary.
See Forges.

Sanderson Brothers Steel Company, Syracuse, Onondaga county. Established in 1876; 8 heating furnaces, 3 forge fires, 4 annealing furnaces, 2 steel cementing furnaces, 9 hammers, 3 trains of rolls, (9, 10, and 12-inch,) and one 16-pot and four 12-pot Siemens steel-melting furnaces; use clay pots made by the company; product, hammered and rolled crucible steel of every description, shear steel, and blister steel; specialty, the finest quality of steel; annual capacity, 3,000 net tons. Brand, "Sanderson Bros. & Co." C. H. Halcomb, President and General Manager; W. F. Belknap, Secretary.

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

Star Iron Works, Bowen & Signor, Saranac, Clinton county. Built in 1878; 2 trains of rolls, operated in connection with a forge; product, nail rods, bolt and rivet rods, bars for crucible steel, etc. Works idle and in the hands of a receiver. *See Forges.*

Syracuse Iron Works, Syracuse, Onondaga county. Built in 1861; 5 double and 2 double-double puddling furnaces, 6 heating furnaces, 3 trains of rolls, (one 8, one 9, and one 19-inch,) and 2 hammers; product, best grades of merchant bar, wire-rod, band, and hoop iron, railroad and boat spikes, fish bolts, horse-shoe and bridge iron, horse shoes, and cotton-ties; annual capacity, 10,000 net tons. Brand, "S. I. W." A superior quality of iron from charcoal pig is branded "E. B. B." The works are in the hands of a receiver, and are idle and for sale.

Syracuse Steel Foundry Company, Syracuse, Onondaga county. Built in 1886, and first castings made in November; one 16-pot Sweet's gas steel-melting furnace; product, crucible steel castings; annual capacity, 325 net tons. Building a new foundry, to contain three additional steel-melting furnaces, to be completed in January, 1888; when completed the annual capacity will be 1,150 net tons.

Troy Steel and Iron Company, Troy, Rensselaer county. New York office, 26 Broadway. Property formerly owned by the Albany and Rensselaer Iron and Steel Company. Albany Iron Works, established in 1819; 7 double and 14 single puddling furnaces, 23 heating furnaces, 7 trains of rolls, 4 steam and 2 trip hammers, and 2 bolt, 8 rivet, and 2 nut machines; steam and water power; product, bars, car axles, bands, hoops, finger-bars, crow-bars, fish-plates, bolts and nuts, and boiler rivets; annual capacity, 37,000 net tons. Brands of

iron, "A. I. W.," "Corning's Best Best," and "Troy." Rensselaer Iron Works, established in 1846; three-high steel rail mill and merchant mill built in 1866 and 1867; first steel rail rolled in 1866; new merchant mill built in 1877 and 1878; 23 heating furnaces, 5 trains of rolls, and 2 steam and 2 trip hammers; product, steel rails, steel shapes and sheets, and special and agricultural steels; annual capacity of rail mill, 120,000 net tons; capacity of merchant mill, 25,000 tons. Brands of steel, "XX Gun," "XX Special Dead Soft," and "XX Gun Barrel," besides a variety of other special grades. Bessemer steel works built in 1864; made their first blow February 16, 1865; 2 converters, each of 10 gross tons capacity; 4 cupolas and 4 spiegel cupolas; annual capacity, 300,000 net tons ingots; blooming department contains 5 heating furnaces and an adjustable train of 31½-inch rolls; capacity to roll full product of converting department; steam-power, with auxiliary water-wheel. Henry H. Rogers, President; William Kemp, Vice-President; Selden E. Marvin, Secretary and Treasurer; Robert W. Hunt, General Superintendent. *See Furnaces.*

Ulster Iron Works, William Mulligan, Saugerties, Ulster county. Built in 1827; one single and 8 double puddling furnaces, 4 heating furnaces, 6 trains of rolls, and one hammer; water-power; product, bar, rod, and hoop iron; annual capacity, 6,700 net tons. Product called "Ulster" iron.

Westerman Rolling Mill, Westerman & Co., Lockport, Niagara county. Built in 1870; one puddling furnace, 3 heating furnaces, and 2 trains of rolls; water-power; product, hoops, bands, wire rods, horse-shoe iron, rounds, squares, hexagons, and fancy shapes; annual capacity, 4,000 net tons.

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

Number of rolling mills and steel works in New York: 24. Of these one makes Bessemer steel, one makes open-hearth steel, 5 make crucible steel, and 2 make blister steel.

NEW JERSEY.

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

Boonton Iron Works, Boonton, Morris county. Estate of J. Couper Lord, owner, 68 Wall st., New York. Built originally in 1825; extended since; 12 double puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 134 nail and spike machines; steam and water power. The rolling mill is leased and operated by B. O'Day, Lock Box G, Boonton; product, horse-shoe and tire iron; annual capacity, 4,000 net tons. Brands, "O. D." within a horse shoe for horse-shoe iron, and "Boonton" for tire iron. D. T. O'Day, General Manager. The foundry and large nail works are leased by Henry L. Hubbard, of New York, who produces agricultural implements of all kinds. The small nail factory is leased and operated by Anthony, Patterson & Grubb, who make iron and steel nails for Fuller Brothers & Co., 139 Greenwich st., New York, from nail plate furnished by the latter.

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. Agents for the sale of gas tubes, Getze & Reeves, 7 and 9 North Fifth st., Philadelphia.

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

Dover Iron Works, Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770, and rebuilt several times since; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); steam and water power; product, merchant bar, boiler rivets, socket bolts, and brace jaws; annual capacity, 3,500 net tons. Brand of merchant bar, "Dover;" brand of rivets, "D." George Richards, President; H. W. Crabbe, Secretary and Treasurer. Represented in New York by Fuller Brothers & Co., 139 Greenwich st.

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 and one 10-inch train of rolls; use scrap iron only; product, spikes, splice joints, bolts, rivets, and round, flat, and square bar iron; annual capacity, 8,500 net tons.

Jersey City Steel Company, Jersey City. Commenced operations August 1, 1862; 2 single and 2 double puddling furnaces, 22 heating furnaces, 5 trains of rolls, (two 9, one 12, one 16, and one 18-inch,) 12 steam hammers, and 80 four-pot steel-melting holes; product, cast steel solely; annual capacity, 14,000 net tons. B. Illingworth, President; D. G. Gautier, Secretary and Treasurer.

John A. Roebling's Sons Company, Trenton. Old mill built in 1852, new mill in 1873; 8 charcoal forge fires, 5 heating furnaces, 4 trains of rolls, and one 3-ton steam hammer; product, wire rope and merchant rods; annual capacity, 9,000 net tons. Rolling mill has been running single turn in 1887 on wire rods. Charles G. Roebling, President; F. W. Roebling, Secretary and Treasurer.

Newark Steel Works, Benjamin Atha & Co., Newark, Essex county. Began business in 1864; one double puddling furnace, 36 four-pot steel-melting holes, one 7-gross-ton Siemens open-hearth steel furnace, 12 steam hammers, and 5 trains of rolls (two 8, one 9, one 12, and one 16-inch); product, every kind of cast steel, except sheet; total annual capacity, 14,000 net tons. Brand, "Newark."

Oxford Iron and Nail Company, Oxford, Warren county. New York office, 52 Wall st. Built in 1866; 26 puddling furnaces, 5 heating furnaces, 4 spike furnaces, 103 nail machines, and 4 trains of rolls (one 10, one 12, and two 23-inch); product, nails; annual capacity, 300,000 kegs. Theodore Sturges, President; John I. Blair, Vice-President; Charles E. Sturges, Treasurer; Edmund T. Lukens, Secretary and General Manager, at the works. Sales agent, J. S. Scranton, 83 Washington st., New York. *See Furnaces.*

Passaic Rolling Mills, Passaic Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Built in 1867, and incorporated in 1869; 8 double puddling furnaces, 7 heating furnaces, 5 trains of rolls, (one 9, one 18, one 20, and one 26-inch, and one 30-inch universal,) and 3 hammers; product, beams, channels, angles, tees, and other shapes for buildings and bridges, merchant bars, rivets, nuts, etc.; annual capacity, 20,000 net tons. Specialty, shapes. Brand, "Passaic." Watts Cooke, President; W. O. Fayerweather, Vice-President and Treasurer; A. C. Fairchild, Secretary; John K. Cooke, Superintendent. The company are also bridge builders and contractors; annual capacity of bridge shop, 15,000 net tons.

Paterson Iron Company, Paterson, Passaic county. Works burned and rebuilt in 1887; one train of two-high 108-inch plate rolls and several hammers; product, plates and heavy forgings. Charles D. Beckwith, President and Treasurer; James Johnston, Superintendent.

Pompton Steel and Iron Company, Pompton, Passaic county. Built in 1863; 5 single puddling furnaces, 6 heating furnaces, 42 crucible steel-melting furnaces, 2 trains of rolls, and 5 hammers; water and steam power; 160 pots can be used at each heat in steel works; product,

crucible cast steel and railway car springs; annual capacity, 3,000 net tons. James Ludlum, President and Treasurer; Richard Wright, Secretary; Joseph W. McElroy, Superintendent.

Powerville Iron Works, B. O'Day, lessee, Lock Box G, Boonton, Morris county. Works at Powerville, Morris county. Built in 1845; 2 heating furnaces and 2 trains of rolls (one 8 and one 16-inch); water-power; product, horse-shoe and tire iron, made from scrap; annual capacity, 2,000 net tons. Brand, "P. I. W." Idle and lease for sale. *See Boonton Iron Works. See Bloomeries.*

Rockaway Direct Process Iron and Steel Company, Rockaway, Morris county. Office, 32 Warren st., New York. First put in operation in May, 1886; 3 single puddling furnaces, one Wilson deoxidizer, one 20-inch train of rolls, and one hammer; steam and water-power; product, blooms for steel purposes, made directly from ore. Propose adding a 9-inch guide mill. William A. Torrey, Manager. *See Forges.*

Trenton Iron Company, Trenton, Mercer county. Built in 1845; 11 forge fires, 2 double puddling furnaces, 6 heating furnaces, 2 hammers, (one 2½ and one 3-ton,) and 4 trains of rolls (one 8, one 10, one 12, and one 20-inch); wire works, with 1,005 blocks; product, wire rods, merchant rods, and iron and steel wire; annual capacity of rods, 13,500 net tons. (A small experimental Bessemer converter, built in 1886, is now idle, and will probably never run again.) Abram S. Hewitt, President; William Hewitt, Vice-President; James Hall, Treasurer; E. Hanson, Secretary. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Philadelphia office, 22 North Fourth st.

Trenton Iron Works, New Jersey Steel and Iron Company, Trenton, Mercer county. Built in 1845; 12 double puddling and 13 heating furnaces, 7 trains of rolls, (one 8, one 12, one 19, two 20, and two 26-inch,) and one 3-ton hammer; steam and water power; product, beams, channels, angles, tees, and other shapes, and merchant bars; also, bridges and chains of all sizes; annual capacity, 25,000 net tons. Specialty, shapes. Brand, "Trenton." These works formerly belonged to the Trenton Iron Company, the present company having been organized in 1866. Edward Cooper, President, and Edwin F. Bedell, Secretary, New York; Frederick J. Slade, Treasurer, and Joseph Stokes, Superintendent, Trenton. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

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

Number of rolling mills and steel works in New Jersey: 19. Of these one makes open-hearth steel and 5 make crucible steel.

PENNSYLVANIA.

PHILADELPHIA AND VICINITY.

- Delaware Rolling Mills, Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Built in 1870; 10 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls; product, bar iron specialties; annual capacity, 15,000 net tons. Brands, "H. & P. Best," "H. & P. Best-Best," and "H. & P. Stay-bolt."
- 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, 3 trains of rolls, and one hammer; product, merchant bar iron; annual capacity, 7,500 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 steam hammers; product, frog plates and points, all kinds of steel forgings, and best American cast steel, suitable for shear knives, dies, taps, cold chisels, and lathe tools; annual capacity, 482 net tons.
- Frankford Steel Company, Frankford, Philadelphia. Built in 1865; 5 heating furnaces, 5 hammers, (2 tons to 600 pounds,) 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.
- Gray's Ferry Iron Works, Edward S. Buckley, 209 South Third st., Philadelphia. Built in 1858 by the present owner; 3 double puddling furnaces, 4 charcoal forge fires, 3 heating furnaces, 2 trains of rolls, and 2 hammers; product, plate iron of all kinds and charcoal blooms; annual capacity, 4,800 net tons of plates and 600 tons of blooms. *See Charcoal Furnaces.*
- Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Built in 1845; 9 double puddling furnaces, one scrap and 7 heating furnaces, 7 trains of rolls, and 41 nail machines; product, nails, merchant bar, band, hoop, and skelp iron, angle iron from $\frac{3}{4}$ to 2 inches in size, and steel plow, cultivator, and shovel plate; annual capacity, 11,000 net tons. Brand, "Anvil."
- Keystone Horse Shoe Company, Seventeenth and Clearfield sts., Philadelphia. Mill first put in operation January 1, 1873, rebuilt in 1884; 3 heating furnaces and 3 trains of rolls; trains arranged to make the rolling partly continuous; product, bar, hoop, band, and skelp iron. George H. Boker, President; William Gerhard, Secretary and Treasurer; W. G. Howell, Superintendent.
- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. The manufacture of saws started in 1840, and the manufacture of steel in 1854; two 24-pot Siemens

steel-melting furnaces, and 20 two-pot and 3 four-pot coal 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,) 15 heating furnaces, and one hammer; product, principally saw steel of every description; also, steel for engravers' plates and sheet steel of all kinds; annual capacity, 4,836 net tons. An 18-inch bar train added in 1887, and a 9-inch train in course of construction; product, bar steel of all kinds. The steel works were originally built in Philadelphia, and were removed to Tacony in 1879, 1881, and 1883. Brand, "Disston." Hamilton Disston, President; Horace C. Disston, Vice-President; William Disston, 2nd Vice-President; Jacob S. Disston, Treasurer; Robert J. Johnson, Secretary; Samuel Disston, Agent.

Midvale Steel Company, Nicetown, Philadelphia. Branch office, 333 Walnut st., Philadelphia. Built in 1866; one 15-gross-ton, one 12-ton, and one 7-ton Siemens open-hearth steel furnace, 12 four-pot steel-melting coal fires, 20 bituminous and 8 anthracite gas producer fires, 12 coal and 6 gas heating furnaces, 9 hammers, (from 9 tons to 300 pounds,) two tire mills, with monthly capacity of 6,000 tires, and 2 trains of rolls (one 12 and one 23-inch). A well-equipped machine shop attached, as well as blacksmith, moulding, and annealing shops. Product, open-hearth and crucible steel, consisting of locomotive tires, axles, miscellaneous forgings, and castings; tool, file, spring, machinery, and frog steel, and rolled steel shapes; also forgings and castings for ordnance purposes. Special attention paid to forgings and castings required to stand severe physical tests. Daily capacity, 75 net tons; annual capacity, 15,000 net tons. C. J. Harrah, President; C. J. Harrah, Jr., Vice-President; R. W. Davenport, Manager; J. C. Dessallet, Treasurer; E. W. Kimber, Secretary.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1842 on Frankford creek; began to make steel in 1845; removed to present location, 2 miles distant, in 1849; much enlarged in later years, especially in 1873; 5 heating furnaces, 3 trains of rolls, (one 12, one 14, and one 16-inch,) 2 hammers, one cementing furnace using wood exclusively, 2 cementing furnaces using coal, and 24 two-pot crucible steel-melting furnaces; convert Swedish iron into steel, reroll Norway iron, slit Norway nail rods, roll purchased Bessemer and Siemens-Martin steel, and make elliptic springs, sheet cast steel, cast spring steel, machinery and plow steel, and tire and sleigh steel; annual capacity, 4,500 net tons.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; one single and 16 double puddling furnaces, 14 heating furnaces, and 5 trains of rolls (one 12, one 18, two 20, and one 23-inch); product, all shapes in either iron or steel, channel bars from 2 to 15 inches, beams from 3 to 15 inches, deck beams from 5 to 12 inches,

tees from 1 to 5 inches, angles from 1 to 7 inches, flats from 1 to 12 inches wide, rounds from $\frac{1}{2}$ to 7 inches in diameter, hammered and rolled axles, bar and bridge iron, and shafting; the forge has 3 hammers; annual capacity, 35,000 net tons. Specialties, structural shapes, axles, shafting, slot rail for cable roads, and bridge iron. Brand, "Pencoyd." Steel converting department contains two 15-gross-ton open-hearth steel furnaces built in 1887; building one 15-ton hammer and two reheating furnaces. Bridge and construction department contains equipments for all classes of bridge and architectural work; also, standard wrought-iron turn-table; annual capacity of bridge plant, 15,000 net tons.

Penn Treaty Iron Works, Marshall Brothers & Co.,*24 Girard avenue, Philadelphia. Works at 1215 Beach st. Built in 1856; 9 single puddling furnaces, 6 heating furnaces, and 3 trains of sheet rolls and 2 trains of plate rolls; product, plate and sheet iron; annual capacity, 10,000 net tons. Brands, "Penn Treaty," "Keystone," and "Iron-sides."

Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Built in 1858; 8 double puddling furnaces, one busheling furnace, 5 heating furnaces, and 4 trains of rolls (two 9, one 17, and one 22-inch); product, plates, skelp, bands, hoops, bars, and rods; annual capacity, 12,000 net tons. Brand, "S. R. Best." *See Schuylkill Valley Furnaces.*

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

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

EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

Allentown (The) Rolling Mills, 237 South Third street, Philadelphia. Works at Allentown, Lehigh county. Built in 1860; 2 single and 23 double puddling furnaces, 12 heating furnaces, and 8 trains of rolls; product, T and street rails from 16 lbs. upwards, fish-plates, merchant bars, angles, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars; annual capacity, 35,000 net tons. A. Pardee, Jr., President; H. W. Allison, Secretary and Treasurer. *See Glen Iron Works. See Lehigh Valley Furnaces.*

Bethlehem (The) Iron Company, Bethlehem, Northampton county. Established 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 5 hammers, ranging from one to 7 tons each; product, iron and

steel rails, billets, beams, tees, angles, heavy plates, etc. Bessemer steel works started in 1873; one 1-gross-ton and four 7-ton Bessemer steel converters; first blow made October 4, 1873; first steel rail rolled October 18, 1873; 8 iron cupolas and four spiegel cupolas; 4 soaking pits; product, ingots for rails, etc., and light and heavy castings. In advanced stage of construction: Pernot open-hearth steel plant, consisting of two 15-gross-ton furnaces, one 15-gross-ton preheating furnace, 2 hydraulic hoists, cranes, etc. Machine shop, blacksmith shop, and foundry connected with the works. Four new open-hearth steel furnaces building. Contracts have been awarded to this company by the United States Government for the manufacture of about 1,200 tons of gun forgings and about 6,700 tons of armor plates, etc. The company is now erecting the buildings, furnaces, and other necessary appliances and machinery for supplying the requirements of the Government. Robert H. Sayre, General Manager; Alfred Hunt, President; William W. Thurston, Vice-President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; John Fritz, Chief Engineer and General Superintendent. *See Lehigh Valley Furnaces.*

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

Blandon Rolling Mill Company, Blandon, Berks county. Built in 1867, and enlarged and improved in 1880 and 1887; 10 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, merchant bars, rounds, squares, flats, ovals, half ovals, half rounds, and hoop, band, and skelp iron; specialty, small shapes; annual capacity, 10,000 net tons. Owned by Frank L. Froment, 112 John st., New York.

Brandywine Rolling Mills, Worth Brothers, Coatesville, Chester county. Built in 1881-2, and put in operation in February, 1882; 3 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (20 and 28-inch). Commenced rolling steel in January, 1885, and have constantly increased this branch; product, steel and iron plates for best boiler and locomotive work, and muck bar; annual capacity, 10,000 net tons of plates.

Bristol Rolling Mill, Bristol Rolling Mill Company, Bristol, Bucks county. Built in 1875-6; 4 heating furnaces, 3 trains of rolls, (one 8, one 12, and one 18-inch,) and one "continuous" hoop train; product, bar, band, hoop, and scroll iron; annual capacity, 8,500 net tons of fin-

ished iron. Brand, "Bristol Mill." Charles E. Scheide, President; Gifford V. Lewis, Secretary and 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 two-high and one 31-inch three-high plate trains,) 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; W. P. Hopkins, General Superintendent. Selling agents: Justice Cox, Jr., & Co., 224 South Fourth st., Philadelphia; E. T. Day, 95 Liberty st., New York; and home office, Catasauqua.

Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. Built in 1874-5; 11 double puddling furnaces, 5 heating furnaces, (of which 2 are Siemens heating furnaces,) one hammer, and 4 trains of rolls; product, tank, ship, bridge, and boiler plate iron; annual capacity, 12,000 net tons. Open-hearth steel plant added in 1881-2, consisting of two 15-gross-ton Siemens furnaces; annual capacity, 22,500 net tons of ingots, worked into plates. S. A. Crozer, President; W. H. H. Robinson, Vice-President; C. B. Houston, Treasurer; R. Peters, Jr., Secretary; T. J. Houston, General Manager. Philadelphia office, 238 South Third st. *See Schuylkill Valley Furnaces.*

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Built in 1871; product, steel castings. E. P. Dwight, President and Treasurer; A. G. Lorenz, Secretary; J. J. Deemer, Superintendent.

Coatesville Iron Works, W. J. Carmichael, Manager, Coatesville, Chester county. Built in 1838; 4 double and 3 single puddling and 6 heating furnaces, 4 trains of rolls, and one hammer; steam and water power; product, iron and steel boiler plate and flue iron; annual capacity, 11,000 net tons. Formerly called Viaduct Iron Works. Brand, "Viaduct." Proprietor, Andrew Williams, Plattsburgh, N. Y. *See Laurel Iron Works.*

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. General office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; rebuilt in 1882-3; 7 double puddling furnaces, 7 heating furnaces, and seven 20-inch trains of rolls; steam and water power; product, sheet, flue, and plate iron of all kinds; corrugated iron a specialty; annual capacity, 7,000 net tons. Brands, "Anchor," "Hope,"

- "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.
- Douglassville Iron Company Limited, Douglassville, Berks county. Built as a forge in 1878; converted into a rolling mill in 1887; 5 double puddling furnaces, one steam hammer, and one train of rolls; product, muck bar; annual capacity, 7,400 net tons. D. K. Flannery, President; John H. Egolf, Treasurer; Dr. F. R. Gerhard, Secretary; B. F. Morret, Manager.
- Easton Sheet Iron Works, Reilly & Oliver, Easton, Northampton county. Started February 1, 1872; one double and one single puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and one train of 22-inch rolls; product, bloom and refined sheet iron; annual capacity, 1,000 net tons. Selling agents, Marshall Lefferts & Co., 54 Cliff st., New York.
- Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Built in 1884-5; 8 double puddling furnaces, 2 gas heating furnaces, one 22-inch train of rolls, and 105 nail machines; product, "Keystone" iron and steel nails; annual capacity, 200,000 kegs. G. B. Lessig, Chairman; W. S. Ellis, Treasurer; J. B. Lessig, Secretary.
- Eureka Cast Steel Company, 307 Walnut st., Philadelphia. Works at Lamokin, one mile south of Chester, Delaware county. Built in 1877; product, steel castings of all kinds; specialty, steel propellers and railroad castings. John A. Emereck, President; William H. Dickson, Secretary and Treasurer.
- Gibraltar Iron Works, Simon Seyfert & Co., Reading. Built in 1846, 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 Works, Glasgow Iron Company, Pottstown, Montgomery county. Works at Glasgow. Puddle mill built in 1874; 7 double puddling furnaces and one train of muck rolls; water-power. Plate mill added in March, 1876; steam-power; 3 heating furnaces and one train of rolls 96 inches long; annual capacity, 8,000 net tons of boiler plate. Steel plant built in 1885-6; two 3-gross-ton Clapp-Griffiths converters; made their first blow May 11, 1886; one soaking pit; product, soft mild steel for boiler and fire-box plates; annual capacity, 50,000 net tons. Specialties, "S. B. F." and "S. B. F. B." Comly B. Shoemaker, President and General Manager; Joseph L. Bailey, Treasurer; J. Howell Leeds, Secretary; F. A. Mitchell, Superintendent of steel works. Selling agents, J. W. Hoffman & Co., Philadelphia; D. F. Cooney, New York; Harrington & Robinson, Boston; W. S. Mallory & Co., Chicago.
- Glen Iron Works, The Allentown Rolling Mills, lessees, Allentown.

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

Hamburg Rolling Mill, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Works at Hamburg, Berks county. Built in 1865; 7 double puddling furnaces, one cupola furnace, 2 heating furnaces, one 3-ton hammer, and 2 trains of rolls (10 and 18-inch.) Idle. *See Philadelphia and Reading Rolling Mill. See Port Carbon Iron Works. See Schuylkill Valley Furnaces.*

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

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

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

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

Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Built in 1810; 3 double puddling furnaces, 5 heating furnaces, 2 trains of rolls, and one hammer; steam and water power; product, all kinds of boiler and ship plates, flue and bridge iron, and homogeneous steel plates; also, machine-flanged boiler heads; annual capacity, 11,000 net tons. The puddle mill, operated by steam and water power, occupies the site of the first plate mill built in the United States.

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

Norristown Iron Works, James Hooven & Son, Norristown, Montgom-

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

Parkesburg Iron Works, Parkesburg Iron Company, Parkesburg, Chester county. First started in April, 1873, enlarged in 1887; 4 double puddling furnaces, 6 charcoal finery fires, 5 heating furnaces, one 22-inch train of rolls, one 2-high plate train, 22 x 50, and 2 hammers; product, boiler tube skelp and boiler iron; annual capacity, 9,000 net tons. Brand, "P. I. Co." Horace A. Beale, President; William H. Gibbons, Vice-President; Amos Michener, Secretary; Samuel R. Parke, Treasurer; A. J. Williams, General Manager.

Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Company, W. E. C. Coxe, Superintendent, Reading. Built in 1868; 12 single puddling furnaces, 10 heating furnaces, and 4 trains of rolls (one 12, and three 24-inch); product, rails, splice bars, and muck bars; annual capacity, 50,000 net tons. Specialty, reheated iron rails. Bessemer steel rails are rolled from purchased blooms. Brand, "P. & R." See *Port Carbon Iron Works*. See *Hamburg Rolling Mill*. See *Schuylkill Valley Furnaces*.

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Built in 1808; 21 double puddling and 9 heating furnaces, and 4 trains of rolls, (one 3-high 26-inch and three 3-high 20-inch). New mill built in 1873; 3 small and 10 large and 3 double Siemens heating furnaces, 24 Siemens and 20 Wilson gas producers, using anthracite coal, and 5 trains of rolls (one 9, one 13, two 20, and one 24-inch). Product, bar iron, beams, angles, tees, other shapes, and rails; combined annual capacity, 50,000 net tons. Building two 15-ton open-hearth steel furnaces and a blooming mill; product to be rolled into structural shapes. David Reeves, President; W. H. Reeves, General Superintendent; George Gerry White, Secretary; James O. Pease, Treasurer. See *Safe Harbor Rolling Mill*. See *Schuylkill Valley Furnaces*.

Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Telegraph address, Pottstown. Two mills: Pine Iron Works and Glendale Iron Works, the former built in 1845 and the latter in 1881; 4 heating furnaces and 2 trains of rolls (one 72 in. x 18 in. and one 84 in. x 24 in.); steam and water power; product, iron and steel plates of all kinds; annual capacity, 6,000 net tons. Brands, "Pine" iron and "Pine" steel, for the most severe requirements.

Plymouth Rolling Mill Company, Conshohocken, Montgomery county. Philadelphia office, 261 South Fourth st. Built in 1881-2; 8 double puddling furnaces, 6 heating furnaces, 4 trains of rolls, and 12 nail machines; product, muck bar, plate and sheet iron, plate and sheet

steel, and nails; annual capacity, 10,500 net tons of muck bar, 9,500 tons of finished iron, and 20,000 kegs of nails. Brand, "Plymouth." W. Dwight Bell, President; Theodore W. Trewendt, Secretary; A. Schwarze, Treasurer; S. Fulton, General Manager. *See Schuylkill Valley Furnaces.*

Port Carbon Iron Works, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Works at Port Carbon, Schuylkill county. Eight double puddling furnaces, 3 heating furnaces, 2 spike machines, and 2 trains of rolls (10 and 16-inch). Foundry and machine shop attached. *See Philadelphia and Reading Rolling Mill. See Hamburg Rolling Mill. See Schuylkill Valley Furnaces.*

Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown, Montgomery county. Built in 1846; 8 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls; product, plate iron (comprising boiler, tank, pipe, and flue iron) and muck bar; annual capacity, 9,000 net tons of muck bar and 11,000 tons of plate iron. Specialties, pipe and flue iron. George H. Potts, Chairman; H. C. Hitner, Secretary and Treasurer.

Pottstown Iron Company, Pottstown, Montgomery county. Built in 1863 and extended in 1867; 29 double puddling furnaces, 7 Siemens heating furnaces, 6 forge fires, 95 nail machines, one hammer, and 7 trains of rolls (18-inch muck, 21-inch muck, 23-inch muck, 23-inch nail plate, 24-inch universal, 25-inch plate, and 31-inch plate); product, charcoal blooms, muck bar, nails, and boiler, ship, bridge, and tank plate iron; annual capacity, 35,000 net tons of muck bar, 2,500 tons of blooms, 24,000 tons of plate iron, and 425,000 kegs of nails. Steel works built in 1885-6, with two 10-gross-ton Bessemer converters and a 36-inch blooming mill; first blow made July 1, 1886; also, one 10-ton Siemens open-hearth steel furnace; product used in making nail plate and other plates and merchant steels. William H. Morris, President; Andrew Wheeler, Vice-President; Joseph K. Wheeler, Secretary; William M. Gordon, Treasurer. *See Schuylkill Valley Furnaces.*

Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville. Old mill built to make rails in 1852, rebuilt and improved since, and altered to make shapes in 1877; 10 double puddling furnaces, 12 heating furnaces, one hammer, and 4 trains of rolls (one 12, two 19, and one 23-inch); product, iron and steel beams, channels, angles, tees, bars, and shafting; total annual capacity, 30,000 net tons. Brand, "Pottsville." Steel department contains two 3-ton Clapp-Griffiths converters; first blow made February 2, 1886; product, billets, blooms, and ingots for own use and for sale; annual capacity, 30,000 net tons. Blooming mill built in 1887, containing 32-inch rolls, for blooming Clapp-Griffiths ingots. C. M. Atkins, President; William Atkins, Treasurer and Superintendent; John M. Callen, Secretary. Selling

- agents, J. F. Bailey, 147 South Fourth st., Philadelphia; William H. Wallace & Co., 131 Washington st., New York; A. G. Tompkins & Co., 8 Oliver st., Boston. *See Schuylkill Valley Furnaces.*
- Reading Bolt and Nut Works, J. H. Sternbergh & Son, Reading. Bolt and nut works organized in 1865; rolling mill department organized in 1871; and the whole enlarged in 1872, 1881, and 1886; 3 heating furnaces and 3 trains of rolls (one 9, one 10, and one 12-inch); product, refined merchant bar and bolt iron; also, more especially, bolts, nuts, washers, rivets, etc.; annual capacity, 10,000 net tons.
- Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. Flue-iron mill built in 1836; 12 single puddling furnaces, 4 heating furnaces, 3 trains of rolls, 28 nail machines, and one spike machine; product, cut nails, and bar, band, hoop, and skelp iron; annual capacity, 7,000 net tons. Plate mill built in 1863; 8 double puddling furnaces, 4 heating furnaces, one hammer, and 4 trains of rolls; product, sheet, plate, and bar iron; annual capacity, 10,000 net tons. Also make all sizes of wrought-iron pipes and tubes. Have a steam forge for the production of all kinds of forgings. Edward W. Coit, President; F. W. Ralston, Treasurer. *See Schuylkill Valley Furnaces.*
- 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 merchant bar iron; annual capacity, 6,000 net tons. Also, chain works with 24 hearths, testing machine, etc. L. W. Weissinger, President; C. F. Rahn, Treasurer.
- Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county. Built in 1858; 15 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, and one hammer; product, sheet and plate iron and steel; annual capacity, 15,000 net tons. Howard Wood, President; Jona R. Jones, Secretary and Treasurer. *See Rolling Mills in Delaware.*
- Seyfert Rolling Mills, Samuel R. Seyfert, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Built in 1880-1, and started in March, 1881; 8 double puddling furnaces, 4 heating furnaces, one 4-ton hammer, and 2 trains of rolls (22 and 25-inch); product, boiler plate, boiler-tube skelp, pipe skelp, and puddled bars; annual capacity, 12,000 net tons of plate iron and 10,000 net tons of puddled bars.
- Standard Iron Company Limited, Norristown, Montgomery county. Built in 1857; 11 double puddling furnaces and 2 trains of 18-inch puddle rolls; product, puddled bars; annual capacity, 14,000 net tons. Walter H. Cooke, Chairman; John Slingluff, Secretary and Treasurer. Idle for a number of years.
- Standard Steel Casting Company, Thurlow, Delaware county. Tele-

graph address, Chester. Built in 1883-4, and first put in operation in March, 1884; one 10-ton Siemens-Martin open-hearth steel furnace; annual capacity, 9,000 net tons; one 18-pot steel-melting furnace; annual capacity, 500 net tons; product, open-hearth and crucible steel castings. Robert Wetherill, President; Richard Wetherill, Secretary and Treasurer; Frederick Baldt, Superintendent.

Stony Creek Rolling Mill, Stony Creek Iron Company Limited, Norristown, Montgomery county. Built in 1849, and rebuilt in 1879 and 1887; 5 double puddling and 3 heating furnaces, and 3 trains of rolls; product, plate and skelp iron and puddled bars; annual capacity, 7,500 net tons of plate iron.

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

Tidewater Steel Works, Combination Steel and Iron Company, Chester, Delaware county. Built in 1881; 10 heating furnaces, 3 trains of rolls, (12, 20, and 22-inch,) and 3 rivet machines; product, steel rails, steel and iron fish-plates, track bolts and spikes, angles, and bars; annual capacity, 45,000 net tons. C. A. Weed, President, Chester; E. E. Deniston, Treasurer, and Stephen E. Haas, Secretary, 35 South Third st., Philadelphia.

Valley Iron Works, C. E. Pennock & Co., Coatesville, Chester county. Built in 1837; 5 double puddling and 4 heating furnaces, one 4-ton hammer, and 4 trains of rolls (one 18, one 24, and two 30-inch); product, plate iron; annual capacity, 7,000 net tons.

Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 50. Of these 3 make Bessemer steel, 2 make Clapp-Griffiths steel, 3 make open-hearth steel, one makes crucible steel, 2 make special steel castings, and 2 open-hearth plants are being built.

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. Mc-

Cauley, Secretary; T. S. Gardner, Treasurer; Robert Smiley, Manager of mill.

Anchor Brand Axle Works, Sheldon Axle Company, Wilkesbarre, Luzerne county. Works removed from Auburn, N. Y., in 1886, in process of erection; to contain one 3-high 16-inch train of rolls and one hammer. Product will be bar iron and steel, all to be used in the manufacture of axles. Charles L. Sheldon, President; Charles H. Gillam, Secretary; George S. Bennett, Treasurer; O. C. Hall, Superintendent.

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

Berwick Rolling Mill, The Jackson and Woodin Manufacturing Company, Berwick, Columbia county. Built in 1872; 11 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls (9 and 16-inch); product, merchant bar iron and forgings; annual capacity, 10,000 net tons. Brand, "Berwick." Also manufacture cars and car-wheels and cast-iron gas and water pipe. C. R. Woodin, President; Garrick Mallery, Vice-President; C. H. Zehnder, Secretary; H. F. Glenn, Treasurer.

Central Iron Works, Harrisburg, Dauphin county. First mill built in 1853; one single and 7 double puddling furnaces, 5 heating furnaces, and 5 trains of rolls, (one muck, one 31-inch and one 25-inch roughing, one Lauth 3-high 31-inch and one Lauth 3-high 25-inch chilled finishing,) with shears, cranes, etc.; product, boiler plate and tank iron and boiler plate steel; annual capacity, 13,000 net tons. Charles L. Bailey, President; Edward Bailey, Jr., Vice-President; William E. Bailey, Secretary; G. M. McCauley, Treasurer; John N. Binnix, Superintendent.

Chesapeake Nail Works, Charles L. Bailey & Co., Harrisburg, Dauphin county. Built in 1867; 18 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (20-inch puddle and 16-inch plate,) and 103 nail machines; product, iron and steel nails; annual capacity, 250,000 kegs. Brand, "Chesapeake."

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

Columbia Iron Company, Columbia, Lancaster county. First put in operation July 13, 1886; 5 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (9 and 18-inch); product, bar, skelp, and

horse-shoe iron; annual capacity, 6,000 net tons. Intends adding one 18-inch bar train of rolls, 3 double puddling furnaces, and one heating furnace, which will increase the annual capacity of the works to 12,000 net tons. Andrew J. Kauffman, President; J. W. Yocum, Secretary and Treasurer; C. S. Kauffman, General Manager.

Columbia Rolling Mill Company, Columbia, Lancaster county. Built in 1854; 18 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, skelp and tube iron; annual capacity, 15,000 net tons. Will add 4 more single puddling furnaces. Built to roll rails. John Q. Denney, President and General Manager; John J. Cochran, Secretary; J. W. Steacy, Treasurer. *See Lower Susquehanna Furnaces.*

Cooper, Reynolds & Co., Harrisburg. Original works built in 1865 to roll rails; 10 double and 2 single puddling furnaces, 12 heating furnaces, and 3 trains of rolls (9, 16, and 19-inch); product, skelp iron; annual capacity, 10,000 net tons. Formerly called Lochiel Iron and Steel Works.

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; 4 single puddling furnaces, one heating furnace, 2 trains of rolls, and 18 nail machines; product, nails and bar iron; annual capacity of nails, 25,000 kegs. Brand, "Standard." J. Corcoran, Treasurer; G. L. Bostley, Superintendent of mill.

Dalmatia Nail and Iron Company, Dalmatia, Northumberland county. Telegraph address, Georgetown. First put in operation in March, 1887; 20 nail machines; product, cut nails and spikes. Buildings erected for a rolling mill department. John Bingeman, President; E. G. Shaffer, Vice-President; W. O. Bingeman, Secretary; E. D. Messner, Treasurer.

Danville Nail Works, Danville Nail and Manufacturing Company, Danville, Montour county. Built in 1883, and first nails made August 31, 1883; 3 double puddling furnaces, two 30-ton heating furnaces, 2 trains of rolls, (18-inch puddle and 3-high 20-inch plate,) and 92 nail machines; product, iron and steel nails; annual capacity, 250,000 kegs. D. M. Boyd, President; William C. Frick, Secretary and Manager; R. M. Grove, Treasurer.

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

Eagle Iron Works, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1825; one single puddling furnace, one

heating furnace, and two 15-inch trains of rolls; water-power; product, wire billets, boiler-plate pile covers, and assorted bar iron from $\frac{1}{2}$ -inch round and square to 4-inch tire; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

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

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

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

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Built in 1860; one double and 6 single puddling furnaces, 3 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 18-inch,) and 23 nail machines; product, merchant bar, angle, skelp, and hoop iron, 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 Iron Works, Howard Rolling Mill Company, Howard, Centre county. Built in 1840; 6 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 12-inch, one 16-inch, and one rod mill); new rod mill added in 1887; water-power; product, wire rods. The company intends building a Bessemer steel plant. *See Charcoal Furnaces. See Bloomaries.*

Johnson (Reuben) & Co., 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 100 nail machines; product, iron and steel nails; annual capacity, 200,000 kegs. Brand, "Milton Nail Works."

Juniata Rolling Mill, McLanahan, Smith & Co. Limited, lessees, Holli-

daysburg. Built in 1866; 13 single and one double puddling furnace, 3 heating furnaces, one muck and nail-plate train of rolls combined, one 10-inch train of finishing rolls, and 30 nail machines; product, bar and pipe iron and cut nails and spikes; annual capacity, 8,000 net tons. Brand, "J. B." The members of the company are: James Denniston, J. King McLanahan, A. S. Landis, C. H. Porter, and C. H. Smith.

Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Commenced in 1840; 42 single puddling furnaces, 33 heating furnaces, and 10 trains of rolls, (one 12, two 18, two 20, three 23½, one 31, and one 36-inch,) and 2 hammers; product, light and heavy railroad rails, merchant bars, and car axles; annual capacity, 220,000 net tons of steel and iron rails and 15,000 tons of iron and steel merchant bars and car axles. Bessemer steel works added in 1875; two 7-gross-ton converters, 6 cupolas, and 3 spiegel cupolas; annual capacity, 200,000 net tons of ingots; first blow made October 23, 1875; first steel rail rolled December 29, 1875. Brand, "Lackawanna." E. F. Hatfield, President, 52 Wall st., New York; H. V. Vultee, Secretary, New York; Edward C. Lynde, Assistant Secretary, Scranton, Pa.; Theodore Sturges, Treasurer, New York; E. S. Moffat, General Manager, Scranton, Pa. *See Upper Susquehanna Furnaces.*

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

Lebanon Rolling Mills, Samuel E. Light, Lebanon. Built in 1867; 6 double puddling furnaces, 6 heating furnaces, 6 forge fires, 5 trains of rolls, and 2 hammers; product, boiler plates, skelp, muck bar, and charcoal blooms; annual capacity, plates and skelp iron, 10,000 net tons. *See Bloomaries.*

Lewisburg Nail Works, Lewisburg, Union county. Built in 1884, and first nails made November 10, 1884; 5 double puddling furnaces, one heating furnace, one 18-inch train of rolls, and 41 nail machines; product, iron and steel nails; annual capacity, 100,000 kegs. T. H. Croft, President and Manager; Jonathan Wolfe, Treasurer; E. M. Purdy, Secretary; L. B. Wolfe, selling agent.

Lickdale Iron Company, Lebanon. Works at Lickdale, Lebanon county. Built in 1886-7, and put in operation September 5, 1887; two 3-gross-ton Clapp-Griffiths steel converters and one 24-inch blooming mill; product at present, billets for rails; annual capacity, 22,000 net tons. John H. Lick, President; C. Penrose Sherk, Managing Director; James Meily, Superintendent.

Lock Haven Nail Works, Lock Haven Nail Company, Lock Haven, Clinton county. Built in 1886-7; first put in operation May 20,

1887; 4 double puddling furnaces, one heating furnace, 2 trains of rolls, (one 20-inch muck and one 22-inch plate,) and 20 nail machines; product, iron cut nails; annual capacity, 50,000 kegs; also intend making steel nails. Brand, "Lock Haven Nail Co." S. A. Rumbaugh, President; W. J. S. Sheibley, Secretary; John A. Wilkinson, Treasurer; John Winter, Sr., Superintendent of rolling mill; George B. Rumbaugh, Manager of nail factory.

Logan Iron and Steel Works, Logan Iron and Steel Company, Lewistown, Mifflin county. Office, 218 South Fourth st., Philadelphia. Started in 1869; one single and 10 double puddling furnaces, 5 heating furnaces, 3 hammers, and 5 trains of rolls (one 8, one 12, one 16, and two 18-inch); steam and water power; product, charcoal and refined bar iron, bent truck sides, coupling links, and pins. H. T. Townsend, President; S. H. Pitcher, Secretary; R. F. Kennedy, Treasurer; R. H. Lee, Superintendent. *See Charcoal Furnaces. See Miscellaneous Coke Furnaces.*

Mahoning Rolling Mill, Mahoning Rolling Mill Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Built in 1847, and rebuilt since; 9 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 13½ and one 16½-inch skelp trains, and one 19-inch puddle and breaking down train); product, skelp iron; annual capacity, 24,000 net tons. Also own a large machine shop and foundry with a capacity of 100 tons of castings per week. Abraham S. Patterson, President; Frank P. Howe, Treasurer and General Manager.

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

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

Milton Manufacturing Company, Milton, Northumberland county. Built in 1886-7, and first put in operation in February, 1887; 2 heating furnaces and 2 trains of rolls (one 6 and one 10-inch); product, bar and hoop iron. S. J. Shimer, President; W. N. Taylor, Secretary and Treasurer.

Milton Nail Works, C. A. Godcharles & Co., Milton, Northumberland county. Built in 1875; 4 single and 9 double puddling furnaces, 3 heating furnaces, one 20-inch train of rolls, and 100 nail machines; product, iron and steel nails; annual capacity, 200,000 kegs. Selling agents, R. Johnson & Co., Northumberland.

Milton Rolling Mill and Steam Forge, Milton Iron Company, Milton

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

Montour Iron and Steel Works, Montour Iron and Steel Company, Danville. Built in 1845; 6 double and 27 single puddling furnaces, 19 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, and splice bars; annual capacity, 50,000 net tons. Austin Corbin, President, Philadelphia; W. E. C. Coxe, Vice-President, Reading; 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 Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Works 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; first steel made February 15, 1883; one 15-gross-ton Siemens open-hearth steel furnace, 6 heating furnaces, and 2 trains of rolls (19-inch "combination" and 28 x 84-inch plate); product, steel boiler, ship, and tank plates, shovel plates, rails, shapes, slabs, and machinery and agricultural steel; annual capacity, 60,000 net tons. Building a Bessemer steel plant, to contain two 4-ton converters; 3 iron and 2 spiegel cupolas; blooming department to contain one large Hainsworth soaking pit, and one 32-inch reversing blooming train; product, rail blooms, nail slabs, etc.; annual capacity, 125,000 net tons. F. P. Howe, President and General Manager; Frank Samuel, Vice-President; Walter S. Massey, Treasurer; Charles M. Griffiths, Secretary. *See Upper Susquehanna Furnaces.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 8 single puddling furnaces, one 30-gross-ton 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 bars; 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; an-

nual capacity, 10,000 net tons. Brand, "Paxton." John Q. Denney, Superintendent. Owned by the McCormick Estate.

Penn Iron Works, Penn Iron Company Limited, Lancaster, Lancaster county. First put in operation in April, 1873; 7 double puddling furnaces, 5 heating furnaces, 4 trains of rolls, (one 8-inch guide, one 10-inch guide, one 16-inch bar, and one 18-inch puddle,) and 2 hammers; product, merchant bar iron, hammered and rolled axles, car forgings, bridge work, fish joints, bolts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 15,000 net tons. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Secretary and Treasurer; W. B. Middleton, Superintendent.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; burned and rebuilt in 1886; two heating furnaces and one 10-inch train of rolls; product, bar iron, bolts, nuts, washers, etc.; annual capacity, 9,000 net tons. Henry S. Eckert, President; James Lord, Secretary and Treasurer; H. V. L. Meigs, 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-ton converters; made their first blow in June, 1867; annual capacity, 350,000 net tons ingots, worked into blooms and slabs for structural purposes and plates, nail slabs, rails of all sections, street rails, railroad axles, crossings, frogs, switches, and merchant steels generally. Rolling mill built in 1867-8; blooming mill added to the rolling mill in 1875-6, and put in operation in December, 1876; annual capacity, 200,000 net tons rails. No. 2 blooming mill, reversing, built in 1885-6, and put in operation in 1886. Hammer mill contains 4, 6, and 12-ton hammers. Open-hearth steel plant, containing two 15-gross-ton furnaces, was erected in 1875; furnaces removed in 1883, and two 30-ton furnaces erected; annual capacity, 27,000 net tons ingots, worked into boiler and structural steel and special steels. Merchant mill, erected in 1883, contains one 13 and one 20-inch train. Billet mill erected in 1887, contains one 20-inch train of rolls. There are also machine shops and the necessary repair shops connected with the works. S. M. Felton, President; E. F. Barker, Secretary and Treasurer; Luther S. Bent, Vice-President and General Manager; F. W. Wood, Superintendent; E. C. Felton, Assistant Superintendent. S. W. Baldwin, sales agent, New York. *See Lower Susquehanna Furnaces. See Furnaces in Maryland.*

Portage Iron Company Limited, Duncansville, Blair county. Built in 1839, rebuilt in 1882-3; 20 single puddling and 6 heating furnaces, 5 trains of rolls, (one 18-inch muck, one 15-inch bar, one 10-inch hoop, one 8-inch guide, and one 20-inch nail plate,) and 37 nail machines; product, bar, band, hoop, scroll, and angle iron, and iron and steel

nails; annual capacity, 8,000 net tons of finished iron and 72,000 kegs of nails. Brand, "Portage." William M. Wheatley, President, Duncansville, Pa.; A. R. Whitney, Vice-President, J. P. Meday, Secretary, and D. A. Nesbitt, Treasurer, all at 17 Broadway, New York.

Safe Harbor Rolling Mill, Phoenix Iron Company, Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. Built in 1848; one single and 18 double puddling furnaces, 8 heating furnaces, and 2 trains of rolls; built to make rails, but has made no rails since 1861, and was entirely idle from 1865 to February, 1880; now in condition to manufacture muck bar. T. F. Patterson, General Manager. See *Phoenix Iron Works*. See *Schuylkill Valley Furnaces*.

Scranton (The) Steel Company, Scranton, Lackawanna county. Built in 1881-3; two 6-gross-ton Bessemer steel converters, 5 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, 200,000 net tons of ingots and 175,000 net tons of rails. Brand, "Scranton Steel Co." W. W. Scranton, President and Manager, and E. P. Kingsbury, Secretary and Treasurer, both at Scranton; Walter Scranton, Vice-President, 47 Broadway, New York.

Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 10 heating furnaces, 4 hammers, (one 10-ton Tannet & Walker, one 7-ton Sellers, one 30-cwt. Morris, and one 4,000-lb. helve,) and 2 tire mills; product, steel locomotive and car tires, and forgings. Specialty, locomotive and car-wheel tires. Ingots are obtained from the Otis Iron and Steel Company and are worked here. Brand, the word "Standard" between two anchors. George Burnham, President; William Burnham, Secretary and Treasurer; William G. Neilson, Manager; J. P. Stevenson, Superintendent.

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

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

Towanda Nail Works, R. A. Bostley & Co., Towanda, Bradford county. First started in November, 1872; operated by present firm since De-

ember, 1879; 3 double puddling furnaces, 3 heating furnaces, 31 nail machines, and two 19-inch trains of rolls; product, iron and steel nails; annual capacity, 70,000 kegs. Brand, "Milton Nail Works, Towanda, Pa."

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Forges established in 1809; rolling mill plant added in 1883; 2 regenerative gas heating furnaces and one 16-inch train of rolls; product, principally boiler-tube skelp, made exclusively from pig metal blooms; daily capacity of the rolling mill, 30 net tons. John Y. Boyd, President, Harrisburg; R. C. Neal, Secretary and Treasurer, Tyrone. *See Bloomaries.*

Valentine Ore Land Association, Bellefonte, Centre county. Built in 1798; one heating furnace, 3 double puddling furnaces, and one train of rolls; water-power; product, muck bar; annual capacity, 3,600 net tons. C. A. Mayer, President; F. B. Owen, Treasurer; Charles A. Harte, Secretary, Bullitt Building, Philadelphia.

Watsonstown Nail Works, Watsonstown, Northumberland county. Built in 1886-7 and first put in operation in May, 1887; 2 double puddling furnaces, one heating furnace, one forge fire, one 2-high 18-inch train of rolls, and 18 nail machines; product, iron and steel nails; annual capacity, 45,000 kegs. Brand, "Watsonstown Nail Works." J. H. Wagner, President; D. C. Hogue, Secretary; E. L. Matchin, Treasurer; M. L. Morgan, Manager.

West Lebanon Rolling Mill Company Limited, Lebanon, Lebanon county. One double and two single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and one hammer; product, bar and horse-shoe iron, skelp, chains, and car links and pins; annual capacity, 5,000 net tons. Chain works erected in 1884. T. T. Worth, President; H. M. Capp, Secretary and Treasurer; Jacob Capp, Superintendent.

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

York Rolling Mill, Schall, Steacy & Denney, York, York county. Built in 1869; 8 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (one 18 and two 22-inch,) and one hammer; product, plate and skelp iron; annual capacity, 9,000 net tons. *See Furnaces.*

Number of rolling mills and steel works in Central Pennsylvania: 53 completed, and one building. Of these 3 make Bessemer steel, 2 make Clapp-Griffiths steel, 2 make open-hearth steel, and one is building Bessemer steel works.

PITTSBURGH AND ALLEGHENY COUNTY.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers & Phillips, Pittsburgh, Allegheny county. Lower mills situated at Wood's Run Station, Allegheny City; upper mills situated on Tenth and Fifteenth sts., South Side, Pittsburgh. Operations first begun in 1863; 102 single puddling furnaces, 30 heating furnaces, 14 hammers, and 17 trains of rolls (five 8, three 10, four 16, three 20, one 25, and one 32-inch); product, plate, angle, and structural iron and steel, skelp iron, light T rails, bar iron, etc.; part of the iron is used in the production of wrought-iron hardware, consisting of bolts, nuts, washers, hinges, etc.; annual capacity, 120,000 net tons. Steel works containing two 2-ton Clapp-Griffiths stationary converters, for the production of Bessemer steel for miscellaneous uses, built in 1884; first blow made March 25, 1884; annual capacity in ingots, 48,000 net tons. Mills use natural gas for fuel exclusively. *See Shenango Valley Furnaces.*

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Built in 1852; 84 single puddling furnaces, 37 heating furnaces, 17 trains of rolls, 2 hammers, and 63 nail machines. Bessemer steel works built in 1886; two 7-gross-ton converters; first blow made August 19, 1886; product, iron and steel bars, nails, rails, plates, sheets, cold-rolled shafting, and structural shapes; annual capacity, 175,000 kegs of cut nails and 200,000 net tons of other iron and steel products. Brand, "American." Natural gas exclusively used for fuel. B. F. Jones, Chairman; G. M. Laughlin, Secretary and Treasurer; T. M. Jones, General Manager.

Anchor Nail and Tack Works, Chess, Cook & Co., 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 12 inches wide; annual capacity, 200,000 kegs of nails and 5,000 net tons of plates. New steel plate mill completed at Rankin Station in 1886; gas heating furnaces and 3-high 24-inch plate train. Building at Rankin Station a plant for manufacturing from steel plates "Expanded Metal," a substitute for wire work in fencing, lathing, screens, etc. Fuel used, natural gas exclusively.

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

Braddock Wire Company, Pittsburgh. Works at Rankin Station. Built in 1885-6; 2 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); 4-inch billets rolled directly to No. 5 rods in 18 passes through 4 trains of rolls; product, iron and steel wire rods; annual capacity, 20,000 net tons. Natural gas exclusively used for fuel. Building a mill for drawing rods into wire. William Edenborn, President;

J. W. Gates, Vice-President; Wallace H. Rowe, Secretary and Treasurer; Thomas W. Fitch, Superintendent.

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

Carnegie, Phipps & Co. Limited, successors to the Pittsburgh Bessemer Steel Company Limited, proprietors of the Homestead Steel Works, 48 Fifth Avenue, Pittsburgh. Works at Munhall Station. Built in 1880-1; two 5-gross-ton converters; made their first blow March 19, 1881; first steel rail rolled August 9, 1881; one 30-inch blooming mill, one 23-inch rail and billet train, one 32-inch train for structural shapes; product, rails, blooms, billets, steel beams, and structural steel; annual capacity, 150,000 net tons of ingots, 125,000 tons of rails, and 50,000 tons of other steel products. Open-hearth steel plant completed and put in operation in October, 1886; four 35-gross-ton Siemens-Martin furnaces; one 32 x 120-inch plate train; product, bridge steel, best boiler plates, armor plate, and ship and tank plate; annual capacity, 50,000 net tons. Building a universal mill for slabbing heavy ingots and for armor plates. Also proprietors of Twenty-ninth Street Iron Works, formerly Wilson, Walker & Co. First put in operation in 1862; 41 single puddling and 18 heating furnaces, 6 trains of rolls, (2 universal, one 10, one 15, one 18, and one 20-inch,) 25 forge fires, and 16 hammers, (700 pounds to 7,000 pounds); product, universal mill plates, railway forgings, bridge work, angles, special shapes, axles, and bar iron; annual capacity of rolled iron, 22,000 net tons. Fuel used, natural gas exclusively. John Walker, Chairman; W. L. Abbott, Vice-Chairman; H. P. Smith, Secretary; W. H. Singer, Treasurer; Julian Kennedy, General Superintendent. *See Lucy Furnaces.*

Chartiers Iron and Steel Company Limited, Iron Exchange, Wood and Water sts., Pittsburgh. Works at Putnam P. O., (Mansfield Valley telegraph office,) Allegheny county. Built in 1883-4, and put in operation August 13, 1884; 4 single puddling furnaces, 11 heating furnaces, 8 trains of rolls, and one 4-ton hammer; product, sheet iron and sheet steel; annual capacity, 5,000 net tons. Brand, "Chartiers." Natural gas exclusively used for fuel. John C. Kirkpatrick, Chairman; D. A. Carter, Secretary; B. C. Willson, Treasurer; John Henry, Superintendent.

Clinton and Millvale Rolling Mills, Graff, Bennett & Co., Pittsburgh. Two mills: Clinton on the South Side and Millvale at Bennett Station, on W. P. R. R. Clinton was built in 1846; 7 double and 19 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 42

nail machines. Millvale was built in 1850, burned December 11, 1881, and rebuilt in 1882; 10 Danks rotary puddling furnaces, 4 double, one double-double, and 21 single puddling furnaces, 18 heating furnaces, 10 trains of rolls, and one hammer. Open-hearth steel plant built in 1886; two 15-gross-ton Siemens-Martin open-hearth furnaces. Erecting one 3-ton Clapp-Griffiths converter, removed from Port Henry, N. Y.; also large steel blooming mill, additional puddling forge, a 31-inch plate mill, and a universal mill for reworking material for structural iron, all of which are expected to be completed in 1887. Product, bars, sheets, and plates; total annual capacity, 90,000 net tons. Natural gas exclusively used for fuel. *See Furnaces.*

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. Built in 1865; 32 heating furnaces, 6 annealing furnaces, 9 trains of rolls, one 60-pot, two 36-pot, and two 24-pot Siemens steel-melting furnaces, and 13 hammers; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 6,000 net tons. Brand, "Crescent." Also have a forge for making iron for their own use, a drill-rod shop, a wire shop, and a spring shop for making coiled springs. Natural gas exclusively used for fuel.

Duquesne Steel Company, Pittsburgh. Building Bessemer steel works; two 6-gross-ton converters. George Boulton, President; Robert B. Brown, Vice-President; William H. Alldred, Secretary and Treasurer; Charles H. Read, General Manager.

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

Edgar Thomson Steel Works, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Began operations in August, 1875; three 10-gross-ton converters; 6 pig-iron cupolas and 4 spiegel cupolas; 14 Siemens heating furnaces; two 3-high blooming mills (one 32 and one 36-inch); one shear and one 3-ton hammer for shearing and clipping blooms; one 23-inch 3-high rail train; forge, containing one 6-ton hammer and 2 heating furnaces, and machine and smith shops attached; product, only Bessemer steel in the several forms of rails, blooms, and billets; daily capacity, double turn, 750 gross tons ingots and 650 gross tons rails and billets. First blow made August 25, 1875, and first rail rolled September 1, 1875. Brand, "Edgar Thomson Steel." Use the best quality of Bessemer pig iron, containing not over 0.1 per cent. of phosphorus; natural gas exclusively used un-

der boilers and in heating furnaces. Building a new rail mill to be completed in January, 1888; to contain 5 heating furnaces, 3 trains of 24-inch rolls, hot saw, and finishing machinery; capacity will be about 1,100 net tons in 24 hours. Henry Phipps, Jr., Chairman; David A. Stewart, Vice-Chairman and Treasurer; Samuel E. Moore, Secretary; William R. Jones, General Superintendent. *See Union Iron Mills. See Furnaces.*

Elba Iron and Bolt Company Limited, Elba Station, Baltimore and Ohio Railroad, Pittsburgh. Built in 1862; 28 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 8, one 10, one 18-inch, and one muck train); product, washers, merchant bar, skelp iron, etc.; specialty, skelp iron; annual capacity, 26,000 net tons. Formerly called Pittsburgh Bolt Works. Fuel used, natural gas exclusively. Charles Donnelly, Chairman; T. B. Everson, General Manager.

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

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Open-hearth steel works added in 1882, and started in August, 1882; two 12-gross-ton Siemens open-hearth furnaces; one 12-pot crucible furnace, started in May, 1885; product, steel castings; annual capacity, 18,000 net tons. Use natural gas for fuel in all departments except air furnace and cupolas. Building a new steel foundry, to contain two 20-gross-ton open-hearth furnaces; when completed the present steel foundry will be converted into an iron foundry. James Hemphill, Chairman; W. Wade, Secretary; Pennock Hart, Treasurer; N. A. Hemphill, Superintendent.

Fort Pitt Iron and Steel Works, Carbon Iron Company, Pittsburgh. New York office, Mills Building. Built in 1862; 22 single puddling furnaces, 18 heating furnaces, 7 hammers, 14 furnaces for producing iron direct from the ore, one 3-ton open-hearth furnace, two 30-pot Siemens steel-melting furnaces, and 8 trains of rolls (two 8, one 9, one 12, two 16, and two 22-inch); product, blooms, billets, and bars, made direct from the ore, crucible steel, and open-hearth steel; annual capacity, 10,000 net tons. Intends erecting two 20-ton open-hearth furnaces, and will alter the mill to turn out 30,000 tons of structural steel per year. Will also erect 16 direct-process furnaces. Natural gas exclusively used for fuel. C. M. Raymond, President, F. B. Robinson, Vice-President; John D. Slayback, Treasurer; William Brandreth, Secretary; Andrew Dickey and Matthew Graff, Managers.

- Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Built in 1857; 28 heating furnaces, 23 railroad spike machines, and 5 trains of rolls, (two 8, one 10, and two 16-inch,) two trains being continuous trains for spike iron; product, railroad and marine spikes; annual capacity, 30,000 net tons. Brand, "Dilworth, Porter & Co." Natural gas exclusively used for fuel. Charles R. Dilworth, Chairman; Samuel T. Owens, Vice-Chairman; Joseph R. Dilworth, Secretary and Treasurer.
- Hussey, Binns & Co. Limited, Pittsburgh. Steel plant built in 1875; one 24-pot Siemens steel-melting furnace, 4 sets of rolls, 18 heating furnaces, one steam hammer, 3 helve hammers, and numerous machines used in shovel-making; product, crucible cast steel, used by the firm in making shovels, spades, and scoops; annual capacity, 1,500 net tons ingots. Fuel used, natural gas exclusively. Edward B. Alsop, Chairman; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent.
- Hussey, Howe & Co. Limited, Penn avenue and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 14 hammers, with 20 furnaces, 6 smith-shop fires and one smith-shop steam hammer, one double and 4 single annealing furnaces, six 24-pot and two 30-pot Siemens steel-melting furnaces, 11 trains of rolls, (one 9, one 10, one 12, three 16, three 18, one 22, and one 28-inch,) one rake-tooth factory, with 12 bending machines and 12 heating furnaces, one machine shop, with 8 lathes, planers, etc.; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 12,000 net tons of ingots. The open-hearth steel department has one 35-gross-ton Siemens furnace, built in 1886; product, spring, plow, and machinery steel, and plates for boilers, hulls of vessels, etc.; annual capacity, 8,000 net tons of plates, 2,000 net tons of machinery steel, 2,000 net tons of plow steel, and 500 net tons of spring steel. Fuel used, natural gas exclusively. C. G. Hussey, Chairman; James W. Brown, Treasurer. Branch offices, 127 Oliver st., Boston, and 210 Lake st., Chicago.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Established in 1824; two 12-gross-ton Siemens-Martin open-hearth steel furnaces, annual capacity, 12,000 net tons, one built in 1879, and one built in 1881; one 7-gross-ton Bessemer converter, with all modern appliances, made its first blow March 15, 1886; 29 single puddling furnaces, 17 heating furnaces, 4 annealing furnaces, 4 furnaces for heating nail plates, one furnace for annealing nails, 9 hammers, 9 trains of rolls, (2 muck trains, one 16 and one 8-inch bar, 2 sheet trains, 31 x 112-inch plate train, nail-plate train, and blooming-mill train,) 92 nail machines, and 4 horse-shoe machines; product, steel boiler plate, sheet steel, plate steel, fire-box steel, horse-shoe bar, horse and mule shoes, steel blooms, nails, and sheet and plate iron; annual capacity,

60,000 net tons. Brand of nails and horse and mule shoes, "Juniata;" of horse-shoe bar, "Shoenberger;" of sheet and plate iron, three grades, "Penn," "Charcoal," and "Juniata." Fuel used, natural gas exclusively.

Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Built in 1828; 20 single puddling and scrapping furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar, sheet, and plate iron, flat rails, and 12 to 30-lb. T rails; annual capacity, single turn, 6,000 net tons. Fuel used, natural gas exclusively.

Keystone Rolling Mill, Keystone Rolling Mill Company Limited, Pittsburgh. Built in 1865; 36 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls; product, skelp iron; annual capacity, 17,000 net tons. Brand, "Keystone." Fuel used, natural gas exclusively. James McCutcheon, Chairman; N. M. McDowell, Secretary; James H. McCutcheon, Treasurer; Thomas Venners, Superintendent.

La Belle Steel Works, Smith Bros. & Co., Pittsburgh. Built in 1863; two 25 and two 30-ton converting furnaces, one single and 2 double puddling furnaces, 22 forge fires, 21 heating furnaces, one large Swindell gas heating furnace, one 36-pot and two 42-pot Siemens gas steel-melting furnaces, 12 hammers, 6 trains of rolls, (one 9, one 10, one 14, one 16, one 20, and one 24-inch,) and two 15-gross-ton Siemens open-hearth steel furnaces, one built in 1886 and one built in 1887; product, merchant steel of every description; also, rake teeth for sulky rakes, springs, and iron and steel axles; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and 115 Liberty st., New York; C. E. James & Co., Chattanooga, Tenn.

Liggett Spring and Axle Company Limited, Pittsburgh. Works at Spruce and Market sts., Allegheny City. Built in 1865 and 1882; one 30-ton cementing furnace, 5 double and 3 single heating furnaces, one 16-inch train of rolls, and 11 hammers; make German steel, which is used in spring works; product, buggy and wagon springs and axles; annual capacity of finished goods, 3,900 net tons. Fuel used, natural gas exclusively. N. P. H. Hugus, Chairman.

Linden Steel Company Limited, down-town office, Lewis Building. General office and works, Linden Station, (Second avenue, Pittsburgh,) B. & O. R. R. Open-hearth steel works, built in 1879, contains one 25-gross-ton, one 15-gross-ton, and one 10-gross-ton Siemens open-hearth steel furnaces, 16 heating furnaces, blooming mill, one large plate mill, one 18-inch bar mill, one 20-inch sheet train, two 10-inch trains, 6 hammers, and cold-condensed shafting machinery; product, open-hearth steel ingots, blooms, billets, and slabs; rounds, squares, and flats; boiler, tank, armor, and ship plates; sheets, tool, spring, tire, and agricultural steel, and cold-condensed shafting; unusual shapes a specialty; daily capacity, double turn, 75 net tons. Brand, "Linden." Fuel used,

natural gas exclusively. W. J. Lewis, President; Henry Lloyd, Vice-President; Cephas Taylor, Secretary; M. D. W. Loomis, Treasurer; Richard Hurrell, Manager.

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

National Tube Works Company, McKeesport, Allegheny county. Five mills. National rolling mill No. 1 was built in 1879; 15 Siemens double puddling furnaces, 8 heating furnaces, 2 sets of 3-high muck rolls, one plate mill, and one continuous mill; one 18-gross-ton Siemens open-hearth steel furnace added in 1886. National rolling mill No. 2 was built in 1882; 18 single puddling furnaces, one heating furnace, one set of slab rolls, and two 8-ton steam hammers. National rolling mill No. 3 was built in 1886; 36 single puddling furnaces and 2 sets of 3-high muck rolls. National rolling mill No. 4 was built in 1887; 5 heating furnaces, one 13-inch and one 24-inch train of rolls. Finished product of the foregoing mills, boiler tube and pipe iron, boiler plate, and all kinds of wrought-iron pipe; annual capacity, 80,000 net tons. Brand, "National." National Forge and Iron Works were built in 1881; 12 forge fires, one run-out fire, one hammer, one heating furnace, and one set of slab rolls; product, blooms and billets for boiler tubes and boiler plate; annual capacity, 8,000 net tons. Fuel used, natural gas exclusively, from the company's own line. James C. Converse, President; P. W. French, Secretary; William S. Eaton, Treasurer; J. H. Flagler, General Manager; E. C. Converse, Assistant General Manager. Department of Supplies, C. I. O'Connor.

Nellis's Agricultural Works, A. J. Nellis Company, Pittsburgh. Built in 1870; 6 forge fires, 9 heating furnaces, 6 hammers, and five 4-pot steel-melting holes; the spring department contains one Nellis tempering and annealing furnace; product, all kinds of steel and iron for agricultural purposes, tool-steel castings especially adapted to plow shares and plow purposes, etc. Natural gas exclusively used for fuel.

Oliver and Roberts Wire Company Limited, Pittsburgh. Built in 1884 and first put in operation June 12, 1884; 2 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); product, wire rods, drawn into wire by the same company; annual capacity, 25,000 net tons. Natural gas exclusively used for fuel. Henry W. Oliver, Jr., Chairman; George T. Oliver, Vice-Chairman; William H. Cassidy,

Secretary and Treasurer; Henry Roberts, General Superintendent. Pennsylvania Iron and Steel Works, W. J. Hammond & Sons Limited, Pittsburgh. Built in 1843; 12 single puddling furnaces, 1 heating furnace, 1 train of rolls, and one 15-gross-ton open-hearth steel furnace; first steel made in January, 1886; product, muck bar; annual capacity, 3,000 net tons of muck bar. Fuel used, natural gas exclusively. Sheet mill burned in July, 1887. Steel plant not in operation. W. J. Hammond, President; George H. Tattnell, Superintendent.

Pittsburgh Forge and Iron Company, Tenth st. near Penn avenue, Pittsburgh. Built in 1864; 38 single puddling furnaces, 14 heating furnaces, 4 trains of rolls, (one 9, one 16, and two 20-inch,) and 8 hammers (two 4-ton, 5 one-ton, and one 800-lb.); product, bolts, nuts, bar iron, splice bars, draw bars, links and pins, arch bars, shaped iron, and hammered car and locomotive axles; total annual capacity, 29,000 net tons. Brands, "P. F. & I." and "Special." Fuel used, natural gas exclusively. Calvin Wells, President and Treasurer; James K. Verner, Secretary and selling agent; Joseph Kaylor, Manager.

Pittsburgh Iron Works, J. Painter & Sons, Pittsburgh. Built in 1836; 67 single puddling furnaces, 15 heating furnaces, and 13 trains of rolls (six 8-inch, three 10, one 12, one 16, and two 20-inch); product, principally oil, whisky, and trunk hoops; also, hoops for pails, tubs, and wooden ware, cotton-ties, lock iron, stone saws, merchant bands, and hinge iron; annual capacity, 36,000 net tons. Brand, "Painter." Natural gas exclusively used for fuel.

Pittsburgh Steel Casting Company, Twenty-sixth and Railroad streets, Pittsburgh. Built in 1871; two 24-pot and one 18-pot Siemens steel-melting furnaces, one 24-pot coke steel-melting furnace, and 7 annealing furnaces; product, crucible steel castings; annual capacity, 4,000 net tons. One 5-ton Bessemer steel converter, built in 1881; first blow made August 26, 1881; one equalizing pit, one heating furnace, billet mill, slab mill, 200-ton Hainsworth hydraulic forging press, and one 5-ton hammer; product, steel castings and billets; annual capacity, 67,000 net tons. Natural gas used throughout, except in cupolas. W. G. Johnston, President; Thomas C. Lazeare, Vice-President; William Lyon, Secretary; John Irwin, Jr., Treasurer; William Hainsworth, Superintendent.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. Established in 1845; works at Chartiers, P. & L. E. R. R.; present works built in 1882-3; 15 heating furnaces, 3 trains of rolls, (20 and 16-inch and combined 10 and 12-inch,) and 5 hammers, ranging from 7 tons to 750 pounds; two 33-pot Siemens steel-melting furnaces; first crucible steel melted April 11, 1883; one 20-gross-ton open-hearth steel furnace completed in June, 1886; spring and rake-tooth department attached to works; product, plow, saw, sheet, plate, best edge tool, agricultural, and all other grades of crucible and open-

hearth steel, and forgings and springs of all shapes and qualities; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. David Shaw, Superintendent. Sole proprietors, Herbert DuPuy and David Shaw. Selling agents, M. T. Miles & Son, Chicago; McCargo & Crowell, Philadelphia; H. J. Hopper, New York.

Republic Iron Works Limited, First avenue and Smithfield st., Pittsburgh. Built in 1863; 26 single and 12 double puddling furnaces, 12 heating furnaces, 4 sheet furnaces, 10 forge fires, and 9 trains of rolls (one 10, one 16, two 20, three 22, one 24-inch, and one 3-high plate train); product, boiler tube and pipe iron, and sheet and plate iron; annual capacity, 25,000 net tons of boiler tube and pipe iron, 5,000 net tons of sheet iron, and 7,500 net tons of plate iron. Brand, "Republic." An extensive galvanizing department is connected with the works. Fuel used, natural gas exclusively. E. C. Converse, Chairman; Horace Crosby, Treasurer and General Manager.

Sable Iron and Nail Works, Zug & Co. Limited, Pittsburgh. Built in 1845; 34 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, (one 8, one 10, and one 16-inch, one universal mill, one 18-inch nail-plate mill, and 3 sets 3-high 20-inch muck train,) and 60 nail machines; product, merchant bar iron, including heavy sizes of flat bars and squares made on the universal rolls, fine grade horse-shoe bar, and iron and steel nails; annual capacity, 125,000 kegs of nails and 20,000 net tons of rolled iron. Natural gas used exclusively for fuel. Brand, "Sable." Charles H. Zug, Chairman; A. F. Keating, 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 Siemens open-hearth steel furnace; 258 pots can be used at each heat in crucible steel works; total annual ingot capacity, 23,000 net tons; product, tool, saw, boiler, and agricultural steel; also, carriage springs and axles and cold-rolled steel. Fuel used, natural gas exclusively. W. H. Singer, Chairman; George Singer, Jr., Secretary and Treasurer. General agents for the Eastern States, Hogan & Son, 243 Pearl st., New York.

Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 34 single puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (12, 16, 18, 24, and 30-inch); product, bars, angles, sheets, and plates, and light T rails; boiler plates a specialty; make "Sligo" bars and "Tyrone" refined iron; boiler heads and flue holes flanged to order; annual capacity, 16,000 net tons. Fuel used, natural gas exclusively.

Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Built in 1859; 32 single puddling furnaces, 2 scrap furnaces, 5 single and 3

double heating furnaces, 4 sheet furnaces, 4 pair furnaces, 5 annealing furnaces, 10 trains of rolls, (include a train capable of rolling plates 12 inches thick, 8 feet wide, and 15 tons in weight,) and 2 hammers; product, "C. H. B." galvanized iron, Juniata, charcoal, and common sheet and plate iron; annual capacity, 25,000 net tons. Open-hearth steel department contains two 15-gross-ton open-hearth steel furnaces; first steel made November 29, 1883; product, steel plate; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. See *Furnaces*.

Solar Iron and Steel Works, William Clark's Son & Co., Pittsburgh. Built in 1869; 24 single puddling furnaces, 7 heating furnaces, and 6 trains of rolls (one 7-inch hoop, two 8-inch hoop, one 9 and one 12-inch bar, and one 20-inch muck); product, hoop, band, box, and scroll iron and steel, and cotton-ties; annual capacity, 15,000 net tons. Brands, "Solar" and "Clark." Fuel used, natural gas exclusively.

Spang Steel and Iron Company Limited, Pittsburgh. Works at Etna, Allegheny county. Built in 1880-1; three 10-gross-ton Siemens-Martin open-hearth steel furnaces, 7 heating furnaces, one hammer, and 4 trains of rolls (one 30-inch bloom, one 30-inch universal, one 18-inch bar, and one 112 x 31-inch plate); product, steel boiler, ship, and tank plates, and machinery and spring steel; annual capacity, 30,000 net tons. Two 3-ton Clapp-Griffiths steel converters built in 1886-7; first blow made March 1, 1887. Fuel used, natural gas exclusively. Campbell B. Herron, Chairman; John C. Porter, Secretary and Treasurer; George A. Chalfant, General Manager; Walter E. Koch, Superintendent. Selling agents, William H. Wallace & Co., New York; George O. Wales & Co., Boston; Escherick & Co., Philadelphia; Ducharme, Fletcher & Co., Detroit; Bassett & Presley, Cleveland; and the L. M. Rumsey Manufacturing Company, St. Louis.

Star Iron Works, Lindsay & McCutcheon, 98 Rebecca st., Allegheny City. Built in 1862; 37 single puddling furnaces, 10 heating furnaces, and 8 trains of rolls (three 8, one 10, one 12, and one 16-inch, and two muck trains); product, hoop, band, and horse-shoe iron; also manufacture a full line of strap and T hinges; annual capacity of rolled iron, 12,000 net tons. Brand, "Star." Use natural gas exclusively for fuel and light.

Sterling Steel Company Limited, 208 Wood st., Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; two 24-pot Siemens steel-melting furnaces, 6 heating furnaces, and 4 hammers (800 to 2,500 pounds); product, fine crucible tool steel; annual capacity, 3,000 net tons. Brand, "Sterling." Use natural gas for fuel. Formerly called Pitt Steel Works. C. Y. Wheeler, Chairman; William P. De Armit, Secretary and Treasurer. Selling agents in New York, Vought & Williams and R. Thompson; Philadelphia, D. H. Corinth, and Hand, Burr & Co.; Boston, McBarron & Co.; Baltimore, Will-

iam G. Wetherall; Chicago, S. D. Kimbark; Louisville, Fulton, Conway & Co.; and others.

Union Iron Mills, Carnegie Brothers & Co. Limited, Pittsburgh. Office and mills, Thirty-third st. Built in 1862; 41 single puddling furnaces, 13 single and 5 double Siemens heating furnaces, and 8 trains of rolls (one 8, one 12, four 18, and two 20-inch); product, iron and steel beams, channels, tees, angles, plates, and bars, and light steel rails; use natural gas for fuel exclusively; annual capacity of rolled iron and steel, 80,000 net tons. William L. Abbott, Superintendent; H. W. Borntraeger, Mill Manager. *See Edgar Thomson Steel Works. See Furnaces.*

United States Iron and Tin Plate Works, United States Iron and Tin Plate Company Limited, Demmler P. O., near McKeesport, Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Built in 1873-4; burned and rebuilt in 1883; 5 single puddling and 2 heating furnaces, 4 knobbling fires, 2 double sheet-mill furnaces, 3 annealing furnaces, 2 tinning stacks, (not in operation at present,) one hammer, one train of bar rolls, 2 trains of sheet rolls, and 3 sets of cold rolls; product, specialties in refined and charcoal polished black sheet iron and Bessemer steel sheets and plates, also sheet-iron dripping pans; annual capacity for black plates and tin plates, 3,300 net tons. Erecting an additional train of sheet rolls, which will increase the capacity to 4,500 net tons. Black plates branded "U. S. A. M." and "J. H." Fuel used, natural gas exclusively. W. C. Cronmeyer, Chairman; F. E. Schenck, Secretary and Treasurer; A. J. Demmler, Superintendent. Eastern agents, Ely & Williams, Philadelphia and New York.

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Works at Sharpsburgh, Allegheny county. Office, 64, 66, and 68 Anderson st., Allegheny City. Built in 1846; 28 single puddling furnaces, 10 heating furnaces, one 4-ton hammer, 7 trains of rolls, (two 8, one 15, two 18, one 20, and one 24-inch,) and 50 nail machines; product, bar, skelp, sheet, and plate iron, and nails; annual capacity, 105,000 kegs of nails and 25,000 net tons of rolled products. An entirely new mill building, of iron, in course of construction. Brand, "Vesuvius." Fuel used, natural gas exclusively. George T. Lewis, Manager.

Vulcan Forge and Iron Works, Long & Co., Pittsburgh. Works at Chartiers Station. Forge built in 1877; rolling mill built in 1882; 20 single puddling furnaces, 5 forge fires, 2 upsetting machines, 7 heating furnaces, 3 trains of rolls, (9, 15, and 18-inch,) and 4 hammers; product, bar iron, bridge iron, and iron and steel forgings, including axles; annual capacity, 12,000 net tons of finished rolled iron and 3,500 net tons of forgings. Brands, "Vulcan" and "L. & Co." Fuel used, natural gas exclusively.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1829;

28 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, 5 hammers, one 36-pot and seven 18-pot steel-melting furnaces, and one 45-ton cementing furnace; product, merchant bar iron, iron boiler plate, and rolled and hammered crucible steel; annual capacity, 15,000 net tons of iron and 7,000 net tons of crucible steel. Brands, "Wayne" and "U. S." Fuel used, natural gas exclusively.

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 57 completed, and one building. Of these 5 make Bessemer steel, 2 make Clapp-Griffiths steel, 15 make open-hearth steel, 13 make crucible steel, 2 make blister steel, one is building Bessemer steel works, and one is building Clapp-Griffiths steel works.

WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

Apollo Rolling Mills, Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Built in 1850; 7 single puddling furnaces, 3 bar furnaces, 4 heating furnaces, 6 annealing furnaces, one 6-ton hammer, and 8 pairs of rolls; two 15-gross-ton open-hearth steel furnaces, built in 1885-6, first steel made June 15, 1886; product, galvanized and smooth-finished iron and steel sheets; annual capacity, 6,000 net tons. Brand, "Apollo." Fuel used, natural gas exclusively. George G. McMurtry, Chairman; Otis H. Childs, Secretary; W. P. Bache, Treasurer.

Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Pittsburgh office, 543 Wood st. Built in 1886; 6 heating furnaces, 2 annealing furnaces, 2 sets of roughing rolls, 2 sets of finishing rolls, 2 sets of cold rolls, and one set of bar rolls; product, fine sheet iron and decarbonized sheet steel; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively. P. H. Laufman, Chairman; W. B. Laufman, Secretary; S. M. Jackson, Treasurer; S. A. Gourley, Superintendent.

Arethusa Iron Works, George W. Johnson, lessee, New Castle, Lawrence county. Built in 1873; 3 double and 11 single puddling furnaces, 9 heating furnaces, 4 trains of rolls, (three 21 and one 24-inch,) and one hammer; product, plate and sheet iron; annual capacity, 13,000 net tons. George W. Hartman, Secretary and Treasurer; Jacob James, Superintendent.

Beaver Falls Rolling Mill, Beaver Falls Iron Company, lessee, Beaver Falls, Beaver county. Built in 1879; 6 single puddling furnaces, 7 heating furnaces, 2 double annealing furnaces, 4 trains of rolls, (14 and 22-inch,) and one double-acting 5,000-pound hammer; product, fine sheet iron; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively. N. E. Whitaker, President; E. C. Ewing, Secretary.

Beaver Falls Steel Works, Beaver Falls, Beaver county. Built in 1875; one 24-pot Siemens steel-melting furnace, one Siemens and 3 other 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." Use natural gas for fuel. James M. May, Treasurer and Superintendent.

Burgess, (Charles,) Titusville, Crawford county. Built in 1879; rebuilt in 1884; 2 single puddling furnaces, one heating furnace, one 16-inch train of rolls, and 3 hammers; crucible steel department has two 6-pot steel-melting holes; product, refined blooms, special tool steel, and a self-hardening tool steel. Fuel used, natural gas exclusively.

Cambria Iron and Steel Works, Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Built in 1853; 9 Siemens and 42 reverberatory heating furnaces, one 7-ton, one 5-ton, one 3-ton, three 6,000-pound, one 3,500-pound, and one 2,500-pound hammers, and the following trains of rolls: One 24-inch and one 21-inch rail mill, 3 sets each; two 21-inch bar mills, 3 sets each; 12-inch splice-bar mill, 3 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 6 sets; 2 rod trains, 9 sets; 48-inch blooming mill, one set; 40-inch blooming mill, one set; total, 35 sets. Bessemer steel works made their first blow July 10, 1871; two 9-gross-ton converters; annual capacity, 200,000 net tons of ingots. Two 15-gross-ton Siemens open-hearth steel furnaces, with the Pernot improvement, built in 1878-9; one 12-ton Krupp washer, which can be used as an open-hearth furnace by changing bottom; annual capacity, 20,000 net tons of ingots. Product, steel rails, splice bars, angles, flats, rounds, axles, billets, and wire rods; capacity of finished steel per annum, 180,000 net tons steel rails and 20,000 net tons steel in other shapes. Have been using natural gas for fuel since November, 1886. Officers in Philadelphia: E. Y. Townsend, President; Powell Stackhouse, Vice-President; John W. Townsend, Assistant to President; William S. Robinson, Secretary; John T. Killé, Treasurer; Harvey Ellis, Assistant Treasurer. Officers at Johnstown: P. E. Chapin, General Manager; John Fulton, General Superintendent; S. P. S. Ellis, Assistant to General Manager; Cyrus Elder, Solicitor and General Agent; Joseph Morgan, Jr., Chief Engineer. *See Gautier Steel Department on next page. See Furnaces.*

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, Lewis Block, Pittsburgh. Built in 1882; 4 single puddling furnaces, 4 knobbling fires, 9 heating furnaces, 2 trains of rolls, one 5-ton hammer, and 3 annealing furnaces; product, finest quality of sheet iron and steel for stamping purposes and galvanizing; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively, from their own wells, adjoining the mill. C. Meyran, President; John Ewing, Vice-President; L. A. Meyran, Secretary and Treasurer; H. S. Duncan, Managing Director; J. F. Budke, General Superintendent of works.

Columbia Iron and Steel Company, Pittsburgh. Works at Uniontown, Fayette county. Built in 1886-7; two 5-gross-ton Bessemer steel converters, 2 soaking pits, one 32-inch blooming mill, one 28-inch train and one 18-inch train of rolls, and 4 heating furnaces; first blow made in steel works September 1, 1887; product, blooms, billets, slabs, beams, channels, angles, tees, bars, and special shapes for architectural and engineering purposes; daily capacity in steel ingots, 150 to 250 net tons. C. Yeager, President; E. M. Butz, Vice-President and Treasurer; R. J. Butz, Secretary.

Etna Iron Works Limited, New Castle, Lawrence county. Consolidation November 1, 1874, of Etna Iron Company and Onondaga Iron and Nail Company; 2 double and 21 single puddling furnaces, 5 heating furnaces, 55 nail machines, and 4 trains of rolls (one 8, one 16, and two 18-inch); product, nails, merchant bar iron and pipe iron; annual capacity, 120,000 kegs of nails and 6,000 net tons of bar and pipe iron. Fuel used, natural gas exclusively. T. M. Sweeny, Chairman and Manager; A. W. Thompson, Secretary. *See Shenango Valley Furnaces.*

Gautier Steel Department of Cambria Iron Company, (formerly Gautier Steel Company Limited,) Johnstown, Cambria county. Works erected in 1878. Rolling mill has 6 trains of rolls, (two 9, two 12, and two 20-inch,) with full equipment of furnaces, shears, hammers, and special machinery; product, merchant bar steel of every size and for every purpose, the specialties being tire, spring, toe-calk, and plow steels; annual capacity, 30,000 net tons. Productions of separate departments: Plow shapes and slabs, annual capacity, 6,000 net tons; finished plow steels, 3,000 tons; harrow teeth, 750 tons; horse-rake teeth, 100,000 sets; steel finger-bars, 125,000 bars; cold rolled steel, 3,000 tons. The wire mill has an annual capacity of 30,000 net tons of fence wire alone; it produces all kinds of market wire—annealed, bright, coppered, tinned, and galvanized, for every purpose; also, telegraph and telephone wire. Use natural gas for fuel. Branch offices, 104 Reade st., New York; 523 Arch st., Philadelphia; 12 Montauk Block, Chicago. *See Cambria Iron Company on preceding page.*

Hartman Steel Company Limited, Beaver Falls, Beaver county. Built in 1883, and first put in operation September 1, 1883; 6 large heating furnaces; the merchant steel department contains 4 heating furnaces and 3 trains of rolls (9, 12, and 18-inch); the rod department contains 2 heating furnaces and a combination rod train; product, merchant steel and wire rods; annual capacity, steel department, 30,000 net tons; wire rod department, 25,000 net tons. Building an 18-inch merchant steel and billet train of rolls. Wire mill produces fence and merchant wire, plain and galvanized; annual capacity, 30,000 net tons. Also, wire-nail factory, steel picket and woven fence factory, steel sign and steel shafting works, steel wire-mat factory, and

copper wire mill. Fuel used, natural gas exclusively. H. W. Hartman, Chairman; G. H. Wightman, Secretary; R. A. Franks, Treasurer.

Johnson Steel Street Rail Company, Johnstown, Cambria county. Building a rolling mill to contain 7 heating furnaces and one 26-inch train of rolls; product, steel rails for street railways and steam railroads; annual capacity, about 90,000 net tons. Will use natural gas for fuel. Arthur J. Moxham, President; Tom L. Johnson, Vice-President; Walter E. Hoopes, Secretary; A. V. du Pont, Treasurer; E. B. Entwisle, Manager.

Kimberly (P. L.) & Co., Sharon, Mercer county. Two mills: Atlantic Iron and Nail Works, at Sharon, Mercer county, built in 1867; 32 puddling furnaces, 8 heating furnaces, 6 trains of rolls, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 20,000 net tons. Greenville Rolling Mill, at Greenville, Mercer county, built in 1871; 26 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, hoop and band iron; annual capacity, 12,000 net tons. Use natural gas for fuel at Sharon. *See Shenango Valley Furnaces.*

Kittanning Iron Company Limited, Kittanning, Armstrong county. Built in 1848, rebuilt in 1880; 33 single puddling furnaces, using natural gas, 5 heating furnaces, and one 3-high 22-inch train; product, muck bar; annual capacity, 12,000 net tons. James Mosgrove, Chairman; Henry A. Colwell, Secretary and Treasurer; Charles T. Neale, General Manager. *See Miscellaneous Bituminous Furnaces.*

Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Iron Exchange Building, Wood and Water sts., Pittsburgh. Built in 1872; 5 single puddling furnaces, 4 knobbling fires, 11 heating furnaces, 4 trains of rolls, and one hammer; one 10-ton open-hearth steel furnace erected in 1884; product, finest quality of stamping irons, and tea-tray, show-card, spoon, shovel, trunk, taggers, Juniata, and lock iron, cold-rolled sheet steel, pan and elbow iron; annual capacity, 4,500 net tons. Use natural gas for fuel exclusively. Brand, "Leechburg." John C. Kirkpatrick, Chairman; B. C. Willson, Secretary and Treasurer.

Middlesex Rolling Mill, C. M. Raymond, West Middlesex, Mercer county. Built in 1873; 16 single puddling furnaces, one Waplington regenerative gas heating furnace, 2 trains of rolls, and one 4-ton hammer; product, blooms for steel purposes. The mill is idle owing to the failure to obtain a supply of natural gas. *See Forges.*

Myers (H. M.) & Co. Limited, Beaver Falls, Beaver county. Rolling mill built in 1883; 2 heating furnaces, 3 trains of 18-inch rolls, and one hammer; product, sheet steel, used by the firm in the production of shovels, spades, grain scoops, etc. Natural gas used exclusively for fuel.

- Old Fort Iron Mills, Brownsville, Fayette county. Completed December 1, 1873; 8 single puddling and 3 heating furnaces, 2 trains of rolls, and one 5-ton steam hammer; product, sheet, bar, and guide iron and hammered blooms and billets; annual capacity, 6,000 net tons. Have been idle for several years.
- Scottdale Iron Works, Scottdale, Westmoreland county. Built in 1873; 8 single and 4 double puddling furnaces, 3 heating furnaces, 5 sheet furnaces, and 3 trains of rolls; product, muck bar and sheet iron; annual capacity, 8,000 net tons of muck bar and 3,000 net tons of sheet iron. Works formerly operated by William H. Everson & Co., who made an assignment in 1887.
- Sharon Iron Company, Sharon, Mercer county. Built in 1852; 11 double and 13 single puddling furnaces, 12 heating furnaces, 7 trains of rolls, (one 8, one 12, one 16, two 18, one 20, and one 24-inch,) and 64 nail machines; product, bar, band, hoop, tank, and sheet iron, light T rails, and iron and steel nails; annual capacity, 30,000 net tons, including 150,000 kegs of nails. Brand, "Shenango." C. H. Buhl, proprietor, Detroit, Michigan; Frank Buhl, General Manager, Sharon; David Adams, Secretary and Treasurer, Sharon. Selling agents, Buhl, Sons & Co., Detroit, Mich. *See Shenango Valley Furnaces.*
- Sharon Steel Casting Company, Sharon, Mercer county. Built in 1887, and first steel made August 26, 1887; one 15-ton Siemens-Martin open-hearth furnace; product, steel castings of all kinds; annual capacity, 10,000 net tons. F. H. Buhl, President; S. McClure, Vice-President; Daniel Eagan, Secretary and General Manager; John Forker, Treasurer; B. F. Watkins, Superintendent. Selling agent, S. P. Davidson, 117 Monroe st., Chicago.
- Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 15 single puddling furnaces, 2 heating furnaces, 2 hammers, (2½ and 5-ton,) and two trains of 3-high 18-inch rolls; product, muck bar and hammered blooms for steel purposes; annual capacity, 9,000 net tons. Will use natural gas for fuel in a short time. Brand, "Stewart." David Stewart, Chairman, 119 Broadway, New York; Theodore F. Hicks, Secretary, New York; Gardner P. Lloyd, Treasurer, New York; Fayette Brown, General Agent, and H. H. Brown, Assistant General Agent, Cleveland; Samuel McClure, Agent, Sharon, Pa. *See Stewart Furnaces in Shenango Valley.*
- West Penn Steel Works, Jennings, Beale & Co. Limited, Stevenson Building, 43 Sixth ave., Pittsburgh. Works at Leechburg, Armstrong county. Built in 1881; one 10-gross-ton Siemens open-hearth steel furnace, one heating furnace, and one 8-ton hammer; rolling mill added in 1886, containing 9 heating furnaces, 2 annealing furnaces, and two 22-inch trains of rolls; product, fine sheet steel and light plate steel; annual capacity, 7,500 net tons. Fuel used, natural gas exclusively. Benjamin F. Jennings, Chairman; John Davis, Treas-

urer; Robert Flenniken, Secretary; Joseph G. Beale, Superintendent.

Wheatland Rolling Mills, Wheatland Iron Company, Wheatland, Mercer county. Built to roll rails in 1872; 13 double puddling furnaces, 12 heating furnaces, and 3 trains of rolls; product, skelp iron.

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 25 completed, and one building. Of these 2 make Bessemer steel, 5 make open-hearth steel, and 2 make crucible steel.

Total number of rolling mills and steel works in Pennsylvania: 199 completed, and 3 building. Of these 13 make Bessemer steel, and 2 Bessemer steel plants are being built; 6 make Clapp-Griffiths steel, and one Clapp-Griffiths plant is being built; 27 make open-hearth steel, and 2 open-hearth steel plants are being built; 21 make crucible steel; 3 make blister steel, and 2 make special steel castings.

EXPERIMENTAL.

At Freeport, Armstrong county, William H. Rogers & Co. have a small plant, consisting of one heating furnace and one hammer, for the production of Russia sheet iron from purchased sheets.

DELAWARE.

Christiana Iron Works, Christiana Rolling Mill Company, lessee, Wilmington, New Castle county. Offices: New York, 12 and 14 Cliff st.; Boston, 8 Oliver st.; Philadelphia, 216 South Third st. Built in 1873-4; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; product, iron and steel plates. G. W. Nicolls, President; W. J. Nicolls, Secretary and Treasurer; J. O. Nicolls, Superintendent.

Delaware Iron Company, 222 South Third st., Philadelphia. Works at New Castle, New Castle county. Mill removed from Bristol, Pa., to New Castle in 1874-5, enlarged in 1879; 4 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, and one hammer; product, boiler plate, tube, and skelp iron; annual capacity, 5,000 net tons.

Delaware Iron Works, Alan Wood Company, Wooddale, New Castle county, near Wilmington. Office, 519 Arch st., Philadelphia. Built in 1812; one grate and annealing furnace and one 20-inch train of rolls; water-power; bars made for these works at Conshohocken, Pa.; product, sheet iron; annual capacity, 550 net tons. *See Rolling Mills in Eastern Pennsylvania.*

Diamond State Iron Company, Wilmington. New York office, Duncan Building, 11 Pine st. Two mills. Diamond State Mill, built in 1853; one single and 4 double puddling furnaces, one scrap furnace, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, and two 18-inch);

product, merchant bar iron, fish-plates, railroad spikes, bolts and nuts, etc.; annual capacity, 15,500 net tons. Old Ferry Mill, built in 1868; one single and 3 double puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 9, one 14, one 16, and one 18-inch); product, horse and mule shoes, fish-plates, railroad spikes, and all kinds of bar iron; annual capacity, 18,000 net tons. Brand, "Diamond State." Clement B. Smyth, President; George W. Todd, Vice-President and Treasurer; Howard T. Wallace, Secretary; John T. Davis, General Superintendent.

Edge Moor Iron Company, Wilmington. Philadelphia office, 1600 Hamilton st. Rolling mill first put in operation in February, 1882. William Sellers, President; John Sellers, Jr., Vice-President; George H. Sellers, General Superintendent.

Marshallton Iron Works, John R. Bringhurst, Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884; 3 double puddling furnaces, 3 grate heating furnaces, 2 reverberatory heating furnaces, one English and one box annealing furnace, and 3 trains of rolls (one 20 and two 22-inch); steam and water power; product, sheet iron; annual capacity, 2,575 net tons. Brands, "Star" and "Delaware cleaned."

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, 2 annealing furnaces, 5 trains of rolls, (two 16 and three 22-inch,) and one hammer; product, "Harvey's patent cleaned" sheet iron; annual capacity, 3,000 net tons. E. A. Harvey, President; Enoch McCullough, Vice-President; J. L. McDaniel, Secretary; Henry Whiteley, Treasurer. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. *See Rolling Mills in Maryland. See Bloomaries.*

Newport Rolling Mills, Marshall Iron Company, Newport, New Castle county. Built in 1873; 4 single puddling furnaces, one reverberatory heating furnace, 2 grate furnaces, one annealing furnace, and three 22-inch trains of rolls; product, black sheet iron and sheet steel, numbers 16 to 28; annual capacity, 1,500 net tons. Brands, a rooster and a diamond. Edward Mendin hall, President; John M. Mendin hall, Secretary; Joseph W. H. Watson, Treasurer.

Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. First mill built in 1845; second, in 1870; another, in 1875; 5 forge fires, 5 heating furnaces, 3 trains of rolls, (17, 19, and 24-inch,) and 3 hammers; product, iron and steel boiler plates; total annual capacity, day turn, 5,000 net tons. H. B. Seidel, President; W. Hastings, Vice-President and General Manager; E. T. Canby, Secretary and Treasurer.

Number of rolling mills in Delaware: 10.

MARYLAND.

Crown and Cumberland Steel Company, Pittsburgh, Pa. Works at Cumberland, Alleghany county, Maryland. Built in 1873-4; rebuilt and enlarged in 1884; 5 heating furnaces, one Siemens 24-pot steel-melting furnace, one blistering furnace, 4 hammers, and 2 trains of rolls (9 and 16-inch); product, all kinds of rolled and hammered tool and machinery steel; annual capacity, 800 net tons. J. Wilson Humbird, President; O. Bergmann, Secretary.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland, Alleghany county. Main office, Mount Clare, Baltimore. First mill built in 1870 as an iron rail mill; bar mill added in 1873; 15 double and 3 single puddling furnaces, 16 heating furnaces, 8 trains of rolls, (one 9, three 12, one 16, two 23, and one 26-inch,) and 2 hammers; product, bar iron, beams and channels, flange and refined plate, rivets and bolts, spikes, fish-plates, angles, and tees; annual capacity, 29,000 net tons. William Robinson, Superintendent.

Locust Point Iron and Steel Works, Coates & Co., Baltimore. Built in 1862; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and one hammer; product, plate, tank, and flue iron and steel; annual capacity, 7,500 net tons.

McCullough Iron Company, Northeast, Elkton, and Rowlandville, Cecil county. Three iron works in Cecil county: Northeast Works, at Northeast; West Amwell Works, at Elkton; and Octoraro Works, at Rowlandville. The Northeast Works were originally built in 1847; 4 single puddling and 6 heating furnaces, 5 trains of rolls, (two 16 and three 22-inch,) and 2 hammers; water and steam power; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron, and refined and best bloom bar iron; annual capacity, 3,000 net tons of sheet and 6,000 tons of bar iron. Brand, "McCullough's." The West Amwell Works, built in 1847; 3 heating furnaces, 2 trains of rolls, and smaller finishing machinery; water-power; stock obtained from Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron; annual capacity, 1,000 net tons. The Octoraro Works were originally built in 1829; 5 heating furnaces and 3 trains of rolls; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron, branded "Octoraro;" annual capacity, 2,000 net tons. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue: E. A. Harvey, President; Enoch McCullough, Vice-President; Joseph L. McDaniel, Secretary; Henry Whiteley, Treasurer. *See Rolling Mills in Delaware. See Bloomaries.*

Number of rolling mills and steel works in Maryland: 6. Of these one makes both blister and crucible steel.

VIRGINIA.

Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle. Enlarged since 1865; 15 double and 5 single puddling furnaces, 5 heating furnaces, 2 gas heating furnaces with Siemens producer, 5 trains of rolls, and 100 nail machines; Bessemer steel works built in 1887; two 3-ton converters, and blooming mill; first blow made October 10, 1887; water and steam power; product, steel slabs and billets, nails and spikes, merchant iron, car iron, axles, etc.; annual capacity, 45,000 net tons of iron and steel. Sole manufacturer of the Walker horse and mule shoes. Brand, "Old Dominion." R. E. Blankenship, President.

Tredegear Iron Works, Tredegear Company, Richmond. Built in 1836; one double and 23 single puddling furnaces, 13 heating furnaces, (including 2 Smith and 2 Siemens gas heating furnaces,) and 7 trains of rolls; water-power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, and horse shoes; annual capacity, 50,000 net tons. Foundry and machine shops, run by water-power, contain 3 air furnaces and 6 cupolas, have melting capacity of 150 tons per day, and make car-wheels, pipes, and machinery. Car shops connected with the works, run by both water and steam power, can turn out 200 freight cars per month. Joseph R. Anderson, President; Archer Anderson, Treasurer; R. S. Archer, Superintendent rolling mills; F. T. Glasgow, Superintendent foundry and machine and car shops; J. F. T. Anderson, Secretary.

Virginia Nail and Iron Works, Virginia Nail and Iron Works Company, Lynchburg, Campbell county. Mill situated $3\frac{1}{2}$ miles above Lynchburg, on the Richmond and Alleghany Railroad. Built in 1867 and refitted in 1880; nail factory added in 1884; one single and 6 double puddling furnaces, 6 heating furnaces, 2 spike machines, 46 nail machines, and 3 trains of rolls (10, 18, and 20-inch); water-power; product, guide iron, round, square, and flat bar iron, nails, and spikes; annual capacity, 100,000 kegs of nails and 4,500 net tons of bar and guide iron. Brand, "Virginia." E. Schaefer, President; C. M. Blackford, Vice-President; T. C. Jones, General Manager and Treasurer. *See Furnaces.*

Vulcan Iron Works, Vulcan Iron Company, Richmond, Henrico county. Bolt and nut works established in 1866; rolling mill added in 1887; one Smith gas heating furnace and one 10-inch train of rolls; product, bars, bolts, nuts, washers, and iron forgings and castings. T. Seddon Bruce, President; Philip A. Bruce, Secretary and Treasurer.

Number of rolling mills and steel works in Virginia: 4. Of these one makes Bessemer steel.

ALABAMA.

- Alabama Rolling Mill Company, Birmingham, Jefferson county. Building a rolling mill five miles north of Birmingham, to be completed early in 1888; 16 single puddling and 3 heating furnaces, and 3 trains of rolls; product, bars, bands, hoops, cotton-ties, light T and street rails. Fred. Sloss, President; W. H. Hassinger, Vice-President; D. M. Forker, Secretary and Treasurer; C. H. Borts, Superintendent.
- Anniston Rolling Mill, Noble Brothers & Co., Anniston, Calhoun county. Built in 1884; 3 double puddling furnaces, 3 heating furnaces, one 22-inch train of rolls, and 4 hammers; product, car axles and merchant bar iron; annual capacity, 7,500 net tons. Adding one heating and one puddling furnace.
- Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Building a rolling mill in 1887, to be completed early in 1888; 24 puddling furnaces; product, all sizes of bar and sheet iron, and rails. Henry F. De Bardeleben, President; L. E. Bruns, Secretary and Treasurer; Lewis Jones, General Manager.
- 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. James G. Caldwell, President; B. du Pont, Secretary; Thomas Ward, General Manager; J. D. Dwyer, Superintendent.
- Brierfield Rolling Mill, Brierfield Coal and Iron 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, nails; annual capacity, 175,000 kegs. T. J. Peter, President; John G. Murray, Secretary and Treasurer. *See Furnaces.*
- Central Iron Works, Helena, Shelby county. Put in operation in March, 1873; 4 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 10 nail machines; product, merchant bar iron and nails; annual capacity, 1,000 net tons. Rufus W. Cobb, President; Richard Fell, Jr., Secretary and Treasurer.
- Henderson Steel and Manufacturing Company, Birmingham. Building one Henderson open-hearth furnace for producing soft steel by the Henderson process. J. W. Bush, President; J. C. Montgomery, Vice-President; H. F. Wilson, Secretary; C. F. Enslen, Treasurer.
- Number of rolling mills and steel works in Alabama: 4 completed, and 3 building. Of those building one is an open-hearth steel plant.

TEXAS.

Houston Rolling Mills, Houston, Harris county. Built in 1884, and put in operation in May, 1884; 3 heating furnaces, 2 spike machines, and 2 trains of rolls; product, light T rails, bars, spikes, fish-plates, and general railroad supplies; annual capacity, 5,000 net tons. Samuel Allen, President; T. W. House, Treasurer; G. C. Street, Secretary. Number of rolling mills in Texas: one.

WEST VIRGINIA.

Belmont Nail Company, Wheeling, Ohio county. Built in 1849; 25 single puddling furnaces, (not now in use,) 3 regenerative gas heating furnaces, 4 forge fires, 2 trains of rolls, and 152 nail machines; product, nails exclusively, made from soft steel slabs; annual capacity, 350,000 kegs. Use natural gas exclusively for fuel. A. Wilson Kelly, President; J. D. DuBois, Secretary and Treasurer; N. Riestler, Superintendent. *See Furnaces.*

Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. Built in 1852; burned in 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 173 nail machines; product, steel nails exclusively; annual capacity, 410,000 kegs. Use natural gas. John G. Hoffmann, President; L. S. Delaplain, Vice-President; Alonzo Loring, Secretary; George Wise, Assistant Secretary. *See Miscellaneous Bituminous Furnaces in Ohio.*

Crescent Iron Works, Whitaker Iron Company, Wheeling. Built in 1855; 15 double boiling furnaces, 3 heating furnaces, and 9 trains of rolls (pairs including bar and muck); product, sheet iron exclusively; annual capacity, 9,000 net tons. Use natural gas exclusively. George P. Whitaker, President, Principio Furnace, Md.; N. E. Whitaker, Secretary, Wheeling.

La Belle Iron Works, Wheeling. Built in 1852 and enlarged since; incorporated December 3, 1875; 23 single puddling furnaces, one coal and 2 regenerative gas heating furnaces, 2 trains of rolls, (20-inch muck and 24-inch 3-high plate,) and 143 nail machines; product, steel nails and muck bar; annual capacity, 350,000 kegs of nails and 12,000 net tons of muck bar; make muck bar for market. Brand, "La Belle." Use natural gas exclusively. C. A. Robinson, President; C. E. Irwin, Secretary; John R. Robinson, Superintendent of forge; W. H. Travis, Superintendent of nail factory.

Moundsville Rolling Mill, Moundsville, Marshall county. Put in operation March 1, 1874; 12 single puddling furnaces, 4 heating furnaces, one scrap furnace, 3 trains of rolls, (one 8, one 16, and one 19-inch,) and 3 Kloman railroad spike machines; annual capacity, 8,000 net tons. Idle. Address Joseph D. Weeks, Pittsburgh, Pa.

Riverside Iron Works, Wheeling. Built in 1859, enlarged since; 42 single puddling furnaces, 11 heating furnaces, 224 nail machines, one hammer, and 7 trains of rolls (one 9, one 12, two 20, two 21, and one 32-inch); product, bar steel, light T rails, skelp, tack plate, and steel nails exclusively; annual capacity, 22,500 net tons of finished bar steel, tack plate, and skelp, and 550,000 kegs of nails. Bessemer steel works built in 1883-4; two 5-gross-ton converters; first blow made June 11, 1884; product, steel, used for general purposes; annual capacity, 75,000 net tons of ingots. Tube works built in 1887 for the manufacture of all kinds of steel and wrought-iron tubes; first tube made August 11, 1887; annual capacity, 33,000 net tons. Brand, "Riverside." Use natural gas for fuel. J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Furnaces in West Virginia and Ohio.*

Top Mill, Wheeling Iron and Nail Company, Wheeling. Built in 1867, and rebuilt in 1872; 26 single puddling furnaces, 3 Smith gas heating furnaces, 130 nail machines, double muck train, and nail-plate train of rolls; product, steel cut nails and spikes; annual capacity, 300,000 kegs. Brand, "Top Mill." Use natural gas for fuel. C. R. Hubbard, President; H. H. Hornbrook, Vice-President; C. D. Hubbard, Secretary and Treasurer. *See Furnaces.*

Wheeling Steel Works, Wheeling. Works at Benwood, Marshall county. Built in 1885-6; first blow made August 12, 1886; two 5-gross-ton Bessemer converters, 2 soaking pits, one gas cobble furnace, and one 36-inch 2-high blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 110,000 net tons of ingots or 100,000 tons of slabs, blooms, and billets. Brand, "W. S. W." Use natural gas for fuel. A. J. Clarke, President; Andrew U. Wilson, Secretary and Treasurer; John E. Fry, General Superintendent.

Number of rolling mills and steel works in West Virginia: 8. Of these 2 make Bessemer steel.

KENTUCKY.

Anchor Iron and Steel Works, L. M. Dayton, 94 West Second st., Cincinnati, Ohio. Works at Newport, Campbell county, Kentucky. Rebuilt and fitted with new machinery in 1874; 5 single puddling furnaces, 4 heating furnaces, 2 scrap furnaces, and 4 trains of rolls (one 10, one 18, and two 20-inch); product, bar, sheet, and plate iron; annual capacity, 6,000 net tons. These works are operated in connection with the American Bolt and Nut Works, owned by the same person. John Phillips, Superintendent of mill.

Ewald Iron Company, 941 North Second st., St. Louis, Mo. Works at Tennessee Rolling Works P. O., Lyons county, and at Louisville, Kentucky. Works in Lyons county, built in 1846; 9 single puddling furnaces, 13 knobbling fires, 7 heating furnaces, 2 hammers, and 5 trains

of rolls (8, 9, 16, 22, and 26-inch); product, boiler plate, sheet iron, bar and rod iron, and blooms; annual capacity, 4,000 net tons. Works at Louisville, formerly called Kentucky Rolling Mill, built in 1869; 14 single puddling furnaces, 3 heating furnaces, 12 knobbling fires and bloom forge, one annealing furnace, one steam shingling hammer, and 5 trains of rolls (one 8-inch, one 12-inch, one 18-inch, one 100-inch plate train, and one 50-inch plate and sheet train, with chill rolls); product, bar, guide, plate, and sheet iron; annual capacity, single turn, 7,000 net tons. L. P. Ewald, President; William Burg, Secretary.

Licking Iron Works, Licking Rolling Mill Company, Covington. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 2 scrap furnaces, 6 knobbling fires, one hammer, and 5 trains of rolls (one 8, two 16, one 20, and one 22-inch); product, merchant bar, bridge, boiler, and sheet iron, rivets, angle, tee, jail, sash, and corrugated-roofing iron; special products, boiler plate, shafting, charcoal bar, angle, and tee iron; annual capacity, 9,000 net tons. I. Droege, President; F. J. Droege, Vice-President; J. C. Droege, Treasurer; B. Macke, Secretary. Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. Built in 1873; 4 knobbling, 11 puddling, 3 scrap, 2 slab, and 2 plate-mill furnaces, 2 annealing and 5 heating furnaces, 2 steam hammers, and 6 trains of rolls; one 7-gross-ton Siemens open-hearth steel furnace, built in 1879; product, plate, sheet, channel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, 15,000 net tons. Brand, "O. V." Walter J. Mitchell, President; Charles J. Tranter, Vice-President; Frank P. Mitchell, Secretary; J. R. Williamson, Treasurer; James Tranter, Superintendent.

Norton Iron Works, Ashland, Boyd county. Put in operation in March, 1874; burned and rebuilt in 1883; 20 single puddling furnaces, 4 heating furnaces, 126 nail machines, and 2 trains of rolls (one 20 and one 22-inch); product, iron and steel nails; annual capacity, 250,000 kegs. Brand, "Norton." John Russell, President and General Manager; D. B. Meacham, Secretary; John Means, Treasurer. Charles L. Colburn, Agent, No. 3 Johnston Building, Cincinnati. *See Furnaces.*

Swift's Iron and Steel Works, Adam Wagner, Assignee, Newport, Campbell county. Built in 1857; 29 single puddling and 14 heating furnaces, 3 box annealing furnaces, 4 forge fires, and 9 trains of rolls (8, 10, and 18-inch bar, 2 forge, 2 sheet, and 2 plate). Product: Swift's hammered soft flange boiler, flange sheet, and tank steel; bloom flange and C. H. No. 1 boiler, tank, and light and heavy sheet iron; bar, shafting, bridge, car, angle, tee, and other shapes, and mine T and street rails; annual capacity, 62,000 net tons. The works are for sale. *See Furnaces.*

Number of rolling mills and steel works in Kentucky: 7. Of these one makes open-hearth steel.

TENNESSEE.

- Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 9 single puddling furnaces, 3 heating furnaces, 41 nail machines, and 4 trains of rolls (8, 15, 16, and 18-inch); product, merchant bar, iron and steel nails, railroad and boat spikes, fish-plates, bolts, nuts, wrought washers, railroad, car, and miscellaneous forgings, and light T and street rails; annual capacity, 12,000 net tons, including 75,000 kegs of nails. W. R. Tuttle, President; O. A. Brown, Secretary and Treasurer.
- Lookout Iron Company, P. O. Box G, Chattanooga. First started in October, 1876; 7 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (8, 16, and 18-inch); product, bar iron, 12 to 16-lb. T rails, and rail splices; annual capacity, 12,000 net tons. Sol. Simpson, President; J. T. Williams, Vice-President and General Manager; J. W. Thornton, Assistant Manager, Secretary, and Treasurer.
- Nashville Iron Company, Nashville, Davidson county. Built in 1886; first put in operation January 1, 1887; 4 single puddling furnaces, 2 forge fires, 4 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 15,000 net tons. William Morrow, President; F. W. Morrow, Secretary and Treasurer; M. F. Allen, General Manager.
- Roane Iron Company, Chattanooga, Hamilton county. Rolling mill built in 1864; 10 heating furnaces, one hammer, and 3 trains of rolls (two 18 and one 20½-inch). Open-hearth steel plant added in 1877-8; first cast made June 6, 1878; two 10-gross-ton Siemens furnaces; 12 gas producers; 36-inch Fritz blooming mill; product, steel for merchant and rail purposes. Puddle mill, built in 1869, removed and one 5-ton Bessemer converter built in 1886-7; first blow made May 7, 1887; product, rails; annual capacity, 30,000 net tons. H. S. Chamberlain, President; D. E. Rees, Secretary. *See Furnaces.*
- Southern Steel Works, John Leighton & Sons, 641 Boyce st., Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883; one single puddling furnace, also used as a heating furnace, one 2,000-pound hammer, and one 4-pot steel furnace; product, best cast steel, suitable for machinery and edge tools, also crow-bars, crank pins, and piston rods.
- South Tredegar Iron Company, Chattanooga. Main office, St. Louis, Mo. Built in 1866; 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, 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; made first blow April 19, 1886; product, steel for nail plate. H. L. Fox, President, St. Louis; C. E. Rubedeaux, Secretary; J. M. Duncan, Vice-President and Superintendent of works.

Number of rolling mills and steel works in Tennessee: 6. Of these 2 make Bessemer steel, one makes open-hearth steel, and one makes crucible steel.

OHIO.

LAKE COUNTIES.

American Wire Company, Cleveland. Built in 1886, and first put in operation in November, 1886; 2 heating furnaces and one train of rolls; product, steel wire rods; annual capacity, 25,000 net tons. Thomas Jopling, President and Treasurer; S. T. Wellman, Vice-President; William Arkless, Secretary and General Manager.

Britton Iron and Steel Company, Cleveland, Cuyahoga county. Built in 1853; rebuilt in 1873; 5 single puddling and 8 knobbling furnaces, 9 heating furnaces, 4 trains of rolls, (one 18, two 21, and one 28-inch,) and one hammer; product, black and galvanized iron and steel plates and sheets; annual capacity, 6,000 net tons. Formerly called Cleveland Boiler Plate Manufacturing Company and Standard Iron Company. J. W. Britton, President; Frank Rockefeller, Vice-President; H. C. Rouse, Secretary; H. F. Carleton, Treasurer.

Cleveland Hardware Company, Lake st., between Belden and Kirtland sts., Cleveland. Built in 1879; one heating furnace and one 9-inch train of rolls; product, shapes for wagon, carriage, and sleigh hardware, rolled from muck bar and scrap; annual capacity, 5,000 net tons. Lee McBride, President; L. Austin, Vice-President; Charles E. Adams, Secretary and Treasurer; Samuel E. Brown, General Manager.

Cleveland Rolling Mill Company, Cleveland. Works principally located at Newburgh. Bessemer steel works built in 1867-8; made first blow October 15, 1868; two 10-gross-ton converters; annual capacity, 150,000 net tons Bessemer steel ingots. Open-hearth steel works built in 1876-8; contain five Siemens-Martin furnaces—two 15-gross-ton and three 7-ton furnaces; annual capacity, 40,000 tons of open-hearth steel ingots. Rail mills built in 1857; 5 heating furnaces, one train of rolls, and blooming mill; annual capacity, 100,000 tons of rails. Three rod mills; 5 trains of rolls; annual capacity, 125,000 tons. Wire mills built in 1868; employ 1,500 men; annual output, 45,000 tons of finished wire. Plate mills consist of 6 single puddling furnaces and 4 trains of rolls (muck mill, 2 sheet mills, and plate mill); galvanizing works attached; annual capacity, 10,000 tons. The company also has a foundry, forge, machine shops, and blast furnaces. The works formerly operated by the Cleveland Iron Company, leased by the Cleveland Rolling Mill Company, consist of 19 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, and one hammer; annual capacity, 40,000 tons of iron rails and merchant bar iron. Product, wire, tire, and spring steel, hoops, wire rods, merchant steel, galvanized and

- black sheet iron, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, Bessemer steel rails, and iron rails. William Chisholm, President; W. B. Chisholm, Vice-President; E. S. Page, Secretary; John Walker, Superintendent. *See Furnaces.*
- H. P. Nail Company, Cleveland, Cuyahoga county. Built in 1880, and first put in operation in March, 1880; 3 heating furnaces, one 9-inch and one 18-inch train of rolls, and 135 wire-nail machines; product, steel wire nails, steel wire rods, and steel wire; annual capacity, 240,000 kegs wire nails and 20,000 net tons rods and wire. S. H. Chisholm, President; C. B. Beach, Vice-President; E. C. Beach, Secretary; M. Baackes, General Manager.
- Lake Erie Iron Works, Lake Erie Iron Company, 101 St. Clair st., Cleveland. Built in 1852; 16 single puddling and 19 heating furnaces, 4 trains of rolls, and 13 hammers; product, locomotive and car axles, iron and steel forgings of every description, iron shafting up to 20-inch round, and merchant bar iron; annual capacity, 19,000 net tons. Nut and bolt works produce daily 40 tons of nuts and bolts of every description used by railroads, car builders, and for agricultural implements. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; James E. Lewis, Superintendent.
- Maumee Rolling Mill, Maumee Rolling Mill Company, Toledo, Lucas county. Built in 1883-4; burned April 10, 1887; rebuilding to be completed in January, 1888; 8 double puddling furnaces, 6 forge fires, 10 heating furnaces, 7 trains of rolls, and one 5-ton hammer; product, sheet, angle, tee, hoop, tank, and merchant bar iron; annual capacity, 16,000 net tons. Will use natural gas for fuel. H. S. Walbridge, President; I. Droege, Sr., Vice-President and Manager; I. Droege, Jr., Secretary; T. H. Walbridge, Treasurer.
- Otis Iron and Steel Company, Cleveland. Built in 1873-4, and put in operation January 1, 1875; 2 rotary puddling furnaces, 7 Siemens heating furnaces, 4 hammers, four 15-gross-ton Siemens open-hearth furnaces, and 4 trains of rolls (one 10, one 20, and two 31-inch); product, steel plate, bar steel, and forgings; annual capacity, 20,000 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, President; Thomas Jopling, Treasurer; J. K. Bole, Secretary; S. T. Wellman, Superintendent.
- Union Rolling Mill Company, 122 Water st., Cleveland. Works at Newburgh. Built in 1866-7; 16 single puddling and 6 heating furnaces, 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, 110 net tons of finished iron. S. W. Sessions, President; A. S. Upson, Vice-

President; A. R. Treadway, Secretary; S. A. Fuller, General Manager and Treasurer; Charles Kennedy, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Lake region: 9 completed, and one building. Of these 2 make Bessemer steel and 2 make open-hearth steel.

MAHONING VALLEY.

Akron Iron Company, Akron, Summit county. Built in 1866; 19 single puddling furnaces, one scrap furnace, 4 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best common, refined, and charcoal bar iron, shafting, and light T rails from 10 to 30 lbs. per yard; specialties, patent calendered iron and steel shafting and irons for agricultural implements; annual capacity, 9,000 net tons. Lewis Miller, President; J. A. Long, Secretary and Treasurer; Frederick Bishop, Superintendent.

Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863 and 1874; 34 single puddling furnaces, 8 heating furnaces, and 6 trains of rolls (one 6, one 7, two 8, one 10, and one 16-inch); product, hoops, bands, horse-shoe iron, bar iron, guide iron, and cotton-ties; annual capacity, 50,000 net tons. Brands, "C., McC. & Co." and "Eagle." Have 3 gas furnaces at work, and using natural gas for fuel. Myron C. Wick, President; W. E. Taylor, Secretary and Treasurer.

Falcon Iron and Nail Works, Falcon Iron and Nail Company, Niles, Trumbull county. Built in 1867; 14 single puddling furnaces, 5 heating furnaces, one scrap furnace, one box annealing furnace, 44 nail machines, and 3 trains of rolls (two 20 and one 22-inch); product, nails and sheet iron; annual capacity, 200,000 kegs of cut nails and 2,500 net tons of sheet iron. Brand, "Falcon." John Stambaugh, President; Warner Arms, Vice-President; Myron I. Arms, Secretary and Treasurer. *See Russia Sheet-Iron Mills.*

Haselton Iron Works, Andrews Brothers & Co., Youngstown, Mahoning county. Built at Niles, Trumbull county, in 1872, and removed to Haselton, Mahoning county, in 1880-1; 11 double and 22 single puddling furnaces, 8 heating furnaces, and 5 trains of rolls (one 8, one 10, one 16, and two 22-inch); product, bar, sheet, rod, skelp, and band iron and steel; annual capacity, 25,000 net tons. Brand, "Haselton." Use natural gas exclusively for fuel. *See Furnaces.*

Hubbard (The) Iron Company, Youngstown. Works at Hubbard, Trumbull county. First put in operation in November, 1872; one double and 10 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 16-inch); product, merchant bar iron; specialty, horse-shoe bar and bolt and nut iron; annual capacity, 15,000 net tons. H. O. Bonnell, President; W. Scott Bonnell, Vice-President; Ralph J. Wick, Secretary and Treasurer.

- Mahoning Iron Works**, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Built in 1846; 42 double and 40 single puddling furnaces, 19 heating furnaces, 50 nail machines, 6 spike machines, and 13 trains of rolls (two 8, two 10, one 12, one 18, two 20-inch, one sheet, and 4 muck); product, merchant bars, I beams, channels, angles, universal-mill plates, angle splices, railroad links and pins, washers, special shapes for agricultural implements, sheets, nails, and railroad and boat spikes; annual capacity, 130,000 kegs of nails and 68,000 net tons of other products. Brand, "Mahoning." Use natural gas for fuel. J. F. Taylor, Receiver's Agent, and John I. Williams, General Manager, Youngstown; Charles H. Hawkins, Receiver's Agent, Chicago. *See Mahoning Valley Furnaces.*
- Mahoning Valley Works**, Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; one single and 28 double puddling furnaces, 12 heating furnaces, 6 trains of rolls, and 55 nail machines; product, merchant bar iron, angles, sheet iron, and nails; annual capacity, 50,000 net tons; also make "Acme" polished shafting; daily capacity, 10 tons. Use natural gas for fuel. H. O. Bonnell, President; Richard Brown, Vice-President; W. Scott Bonnell, Secretary; J. L. Botsford, Treasurer. *See Mahoning Valley Furnaces.*
- Niles Rolling Mill**, Coleman, Shields & Co., Niles, Trumbull county. Built in 1841; 16 single puddling and 7 heating furnaces, one pair furnace, 2 annealing furnaces, and 5 trains of rolls; product, skelp, sheet, and bolt iron; annual capacity, 13,000 net tons. Owners, J. Morgan Coleman, Henry B. Shields, and George J. Margerum.
- Russia Sheet-Iron Mills**, Falcon Iron and Nail Company, lessee, Niles, Trumbull county. Built in 1864; 10 single puddling furnaces, 6 heating furnaces, 2 box annealing furnaces, and 3 trains of rolls; product, sheet iron. *See Falcon Iron and Nail Works.*
- Stirling Chain and Manufacturing 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, Ostrander's patent mandrel-rolled hollow bar iron and staybolt iron, also extra refined iron, and hot-wound chain links; annual capacity, 1,000 net tons.
- Summers Iron Works**, Summers Brothers & Co., Struthers, Mahoning county. Built in 1881-2; 2 double and 2 single puddling furnaces, one pair, 2 heating, and 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." William Summers, President; H. Paterson, Vice-President; S. Summers, Secretary and Treasurer.
- Trumbull Iron Company**, Girard, Trumbull county. Built in 1872 by Girard Rolling Mill Company; put in operation September 1, 1873; purchased by the present company in 1878; 25 single puddling furnaces, 3 Smith regenerative gas heating furnaces, and 4 trains of rolls (one 20-inch muck, and one 7, one 8, and one 10-inch finishing train);

product, all sizes of merchant bar and small T rails; special attention given to the manufacture of iron for agricultural implements, chain, bolt, and nut iron; annual capacity, 18,000 net tons. Henry Wick, President; John C. Wick, Vice-President; Charles F. Hofer, Secretary; George D. Wick, Treasurer and General Manager.

Warren Rolling Mill, Warren, Trumbull county. Built in 1870, burned in 1878, and rebuilt in 1879; 16 single puddling furnaces, 4 heating furnaces, and 2 trains of rolls; product, bar and skelp iron. Operated part of 1887 by Allderdice, Bishop & Co.

Youngstown Rolling Mill, The Youngstown Rolling Mill Company, Youngstown. Built in 1871; burned and rebuilt in 1877; 21 single puddling furnaces, 2 Smith gas heating and 5 coal heating furnaces, one tire-straightening machine, and 5 trains of rolls (7, 8, 10, 12, and 20-inch); fuel, natural and manufactured gas; product, bar, hoop, band, hame, box, tongue-cap, and tire iron and steel, and cotton-ties; annual capacity, 20,000 net tons. Paul Wick, President; Thomas H. Wells, Vice-President; Henry Wick, Secretary and Treasurer.

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 steel castings; annual capacity, 15,000 net tons. Use natural gas for fuel. John Stambaugh, President; George Tod, Vice-President; John Stambaugh, Jr., Secretary and Treasurer; Tod Ford, Business Manager; E. L. Ford, Superintendent.

Number of rolling mills and steel works in the Mahoning region: 15. Of these one makes open-hearth steel.

INTERIOR COUNTIES.

Bowling Green Iron and Steel Company, Bowling Green, Wood county. Building a rolling mill to contain 10 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (9, 18, and 20-inch). Will use natural gas for fuel. Destroyed by a wind storm in October, 1887, after being nearly completed. Work upon it has been resumed.

Canton Steel Works, Bolton Steel Company, Canton, Stark county. Built in 1872; 10 heating furnaces, 3 welding furnaces, 5 hammers, one 12-inch and one 20-inch train of rolls, and one 10-gross-ton Siemens open-hearth steel furnace; first open-hearth steel made August 17, 1875; product, tool steel, cast steel, and spring steel; annual capacity, 3,350 net tons of ingots. Brand, "Canton." Ogden Bolton, President; R. H. Bulley, Vice-President, Secretary, and Treasurer.

Champion Steel and Iron Works, W. N. Whitely, proprietor, Springfield, Clark county. Built in 1886, and first put in operation in October, 1886; 4 heating furnaces; one 9-inch and one 12-inch train of rolls; and 2 steel-nail machines; product, rods, flats, squares, shapes,

- and steel nails; annual capacity, 6,000 net tons. Brand, "Champion." W. T. Stilwell, Manager; J. W. Maxwell, Superintendent.
- Cherry Valley Iron Works, Leetonia, Columbiana county. Formerly called Leetonia Iron and Coal Company. Built in 1871; one double and 16 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, muck bar, merchant bar, and guide iron; annual capacity, 10,000 net tons. J. H. King, President; R. M. Gilbert, Vice-President; C. N. Schmick, Secretary and Treasurer. Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Furnaces.*
- Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus, Franklin county. Built in 1854; 3 single and 6 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, merchant bars, light T rails, wire rods, and iron for harness and saddlery work and for all kinds of chains; annual capacity, single turn, 6,000 net tons. P. Hayden, President; W. B. Hayden, Vice-President; C. H. Allen, 2d Vice-President; A. Hayden, 3d Vice-President; C. H. Hayden, Secretary and Treasurer.
- Columbus Steel Company, Columbus, Franklin county. Original works built to roll rails in 1872; changed to steel works in 1886-7; two 15-gross-ton open-hearth furnaces; first steel made in April, 1887; product, blooms, billets, and slabs; annual capacity, 12,000 net tons. E. L. Hinman, President; H. D. Turney, Vice-President; W. S. S. Rodgers, Secretary and Treasurer; J. J. Thomas, Superintendent of works.
- Findlay Iron and Steel Works, Findlay Iron and Steel Company, Findlay, Hancock county. Built in 1887; 3 single puddling furnaces, 2 heating furnaces, 2 trains of rolls (10 and 18-inch); product, bars and special shapes, horse-shoe iron, etc.; annual capacity, 5,000 net tons. Brand, "Anchor." A. Hurd, President; John A. Scott, Vice-President; E. T. Dunn, Secretary; J. G. Hull, Treasurer; W. H. Carruthers, Manager. Natural gas used for fuel.
- Findlay La Grange Rolling Mills, Findlay, Hancock county. Building a rolling mill to produce merchant iron. Machinery brought from old La Grange Rolling Mills, at La Grange, Mo. F. Thorp and H. A. Andrews, proprietors. Will use natural gas for fuel.
- Findlay Rolling Mill Company, Findlay, Hancock county. Built in 1887, and first put in operation August 6, 1887; one heating furnace and one 10-inch train of rolls; product, merchant bar iron. H. W. Briggs, Manager. Natural gas used for fuel.
- Jackson Steel and Nail Mill Company, Jackson, Jackson county. Building a rolling mill to contain 2 Smith gas-heating furnaces, 2 forge fires, one 22-inch 3-high train of rolls, and 60 nail machines; product, nails; annual capacity, 200,000 kegs. J. M. Tripp, President and Treasurer; J. H. Price, Vice-President; S. J. Long, Secretary; John B. Hastings, Superintendent.

Massillon Rolling Mill, Joseph Corns & Son, Massillon, Stark county.

Built in 1873, and put in operation January 4, 1875; 8 single puddling furnaces, 2 heating furnaces, one regenerative gas heating furnace, and one 9-inch and one 18-inch train of rolls; product, best common and refined bar iron; specialty, iron for agricultural implements; special shapes to pattern; annual capacity, 9,000 net tons.

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

Reeves Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6; first iron rolled in February, 1866; 12 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (8, 10, and 20-inch); product, all kinds of small merchant iron and light T rails; annual capacity, 9,000 net tons. Jeremiah Reeves, General Manager; Jabez Reeves, Superintendent. Formerly called Dover Rolling Mill.

Solid Steel Company, Alliance, Stark county. One 5-gross-ton and one 10-gross-ton open-hearth steel furnace, built in 1883 and 1886, respectively; first steel cast in August, 1883; product, steel castings; annual capacity, 6,000 net tons. T. R. Morgan, Sr., President; S. J. Williams, Treasurer; W. A. Blanchard, Secretary; C. W. Roepper, Superintendent.

Wellston Steel and Nail Mill Company, Wellston, Jackson county. Built in 1886; 2 heating furnaces, one 22-inch train of rolls, and 130 nail machines; product, steel nails; annual capacity, 300,000 kegs. Harvey Wells, President and Treasurer; J. B. Haystings, Vice-President; J. M. Woodward, Secretary.

Zanesville Iron Works, Ohio Iron Company, Zanesville, Muskingum county. The first mill of these works was built in 1848; present company was organized in 1857, and has operated the works since then; now comprise 19 single puddling furnaces, one scrap furnace, 6 heating furnaces, one re-heating furnace, one hammer, and 5 trains of rolls (two 8, one 10, one 16, and one 20-inch); one 10-gross-ton open-hearth steel furnace, completed in November, 1886; product, assorted merchant bar iron and steel and light iron and steel T rails; specialty, agricultural irons; annual capacity, 15,000 net tons. M. Churchill, President; C. W. Greene, Secretary and Treasurer.
See Furnaces.

Number of rolling mills and steel works in Central Ohio: 13 completed, and 3 building. Of these 4 make open-hearth 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; 32 single puddling furnaces, one scrap furnace, 16 heating furnaces, 4 annealing

furnaces, and 8 trains of rolls (one 8, one 9, one 16, one 18, three 20, and one 22-inch); product, iron and soft steel bars, sheets, plates, and bands, and light T and street rails; annual capacity, 20,000 net tons. Use natural gas exclusively for fuel. W. H. Tallman, President; John A. Topping, Secretary; B. M. Caldwell, Manager.

Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. Built in 1852; 21 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 126 nail machines; product, nails; annual capacity, 300,000 kegs. John G. Peebles, President; L. T. Dean, Vice-President; B. H. Burr, Secretary and Treasurer. *See Furnaces.*

Bellaire Nail Works, Bellaire, Belmont county. Built in 1867, and put in operation in February, 1868; 4 heating furnaces, 2 trains of rolls, and 125 nail machines; product, steel nails and spikes; annual capacity, 370,000 kegs. Bessemer steel works built in 1883-4; two 5-gross-ton converters, 2 heating furnaces, and a blooming mill; first blow made April 28, 1884; product, principally soft steel slabs for nail plate and billets; daily capacity, 250 to 300 net tons. Use natural gas exclusively for fuel. James Wilson, President; A. B. Carter, Secretary and Treasurer. *See Furnaces.*

Burgess Steel and Iron Works, Portsmouth. Built in 1871; 9 single puddling furnaces, 12 heating furnaces, one 24-pot Siemens crucible steel-melting furnace, one 8-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, (one 8, one 18, and one 20-inch,) and 5 steam hammers; product, plow steel, (Siemens-Martin, puddled, German, and iron-centre crucible cast,) tool steel, steel and iron boiler plate, "U. S. Norway" refined iron, blooms, five-ply safe steel, and cold-compressed shafting; annual capacity, 7,000 net tons. Building a 10-ton open-hearth steel furnace. George Davis, President; E. N. Hope, Secretary and Treasurer; L. D. York, Superintendent.

Cartwright Iron and Steel Company, Steubenville, Jefferson county. Works formerly known as the Alikanna Rolling Mill, built in 1871-2; 12 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 8 and one 16-inch). Contemplate adding an additional finishing mill. Product, hoops, bands, cotton-ties, and horse-shoe bar. James Cartwright, President; Frank B. Davis, Secretary.

Globe Rolling Mill Company, offices at 163 and 165 West Pearl st., Cincinnati. Mill at 413 West Front st., built in 1845; 9 single puddling furnaces, 3 scrap furnaces, 4 heating furnaces, 3 knobbling fires, 5 trains of rolls, (two 8-inch guide, one 14-inch bar, one 18-inch sheet, and one 20-inch muck bar,) and one 2-ton hammer; product, bar, angle, sheet, and plate iron; annual capacity, 7,000 net tons of bar iron and 1,500 net tons of sheet and plate iron; also produce wire rods and wire; annual capacity, 1,200 net tons of wire. Brand, "Globe." Joseph Kinsey, President; Jacob Walter, Vice-President; L. F. Phipps, Secretary; John Gill, Superintendent.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Branch office, 106 Third ave., Pittsburgh, Pa. Built in 1875; bought and refitted by present owners in 1886; one heating furnace, one puddling furnace, one scrap furnace, 3 sheet furnaces, 2 pair furnaces, 2 annealing furnaces, one bar mill, and two 22-inch trains of sheet rolls; product, sheets for galvanizing, elbow sheet iron, show card sheets, and sheet steel specialties; annual capacity, 3,500 net tons. Will use natural gas for fuel. John C. Wallace, Chairman; H. T. Duff, Secretary; William Banfield, Treasurer and Manager.

Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton, Lawrence county. Built in 1852, and enlarged several times since; 21 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, sheet and plate iron, merchant iron, and light rails; annual capacity, double turn, 13,000 net tons. C. H. Bliss, President; J. H. Kean, Vice-President; J. H. Montgomery, Secretary and Treasurer.

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 3 gas heating furnaces, one 21-inch train of plate rolls, and 152 nail machines; Bessemer steel works added in 1886-7; two 3-gross-ton converters; first blow made March 12, 1887. Blooming mill contains 3-high rolls, with lifting tables, and one Smith regenerative gas heating furnace for ingots. Product, exclusively steel nails; annual capacity, 400,000 kegs. Brand, "Jefferson." Natural gas used for fuel exclusively. W. H. Wallace, President; Calvin B. Doty, Vice-President; G. P. Harden, Secretary; W. H. McClinton, Manager of nail factory. *See Furnaces.*

Junction Iron Company, Mingo Junction, Jefferson county. Branch office, Wheeling, W. Va. Built in 1882, and put in operation November 1, 1882; 4 Smith heating furnaces, 2 trains of rolls, and 126 nail machines; product, steel cut nails and spikes, made from steel furnished by the Laughlin and Junction Steel Company; annual capacity, 350,000 kegs. Brand, "Junction Iron Co." Use natural gas. H. M. Priest, President; George A. Dean, Superintendent. *See Furnaces.*

Kelly Nail and Iron Company, Ironton, Lawrence county. Built in 1883, and first put in operation November 1, 1883; 16 double puddling furnaces, 3 heating furnaces, and 119 nail machines; product, iron and steel cut nails and spikes; annual capacity, 250,000 kegs. William D. Kelly, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer.

Laughlin and Junction Steel Company, Wheeling, W. Va. Works at Mingo Junction, Ohio. Built in 1885-6; two 5-gross-ton Bessemer converters; made first blow February 8, 1886; 4-hole soaking pit, 4-door gas heating furnace, and blooming mill; product, slabs, billets, and blooms for general purposes; annual capacity, 75,000 net tons. Use natural gas. W. L. Glessner, President; M. J. Urquhart, Secretary,

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Built in 1873-4; first keg of nails made March 4, 1874; works destroyed by fire August 8, 1881, but immediately rebuilt; 3 gas heating furnaces, one train of 20-inch rolls, 2 hammers, and 192 nail machines; product, steel nails, made from steel supplied by the Laughlin and Junction Steel Company, of which this company is one-half owner; annual capacity, 500,000 kegs. Use natural gas for fuel. W. L. Glessner, President; F. M. Strong, Secretary.

Lawrence Iron Works, Lawrence Iron and Steel Company, Ironton. Built in 1853; 19 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 8, one 9, one 16, and one 18-inch); product, bar, band, chain, spike, and hoop iron of every variety, cotton-ties, and light T rails from 8 to 30 lbs.; annual capacity, 10,000 net tons. Specialties, chain iron, iron fencing, concave tires, and cotton-ties. George T. Scott, President and Manager; F. C. Tomlinson, Secretary and Treasurer; George T. Scott, General Superintendent. Selling agent, The Hazen Company, Cincinnati.

Middleport Steel and Nail Works, King, Gilbert & Warner, Columbus. Works at Middleport, Meigs county. Built at Clifton, West Virginia, in 1867, removed to present site in 1885, and commenced to make nails in new factory February 22, 1886; 3 heating furnaces, one 20-inch train of rolls, and 102 nail machines; Bessemer steel plant added in 1887; two 3-gross-ton converters; product, Bessemer steel slabs, billets, and nails; annual capacity, 40,000 net tons of steel and 250,000 kegs of nails. Formerly called Standard Nail Works. *See Furnaces in Ohio.*

Pomeroy Iron and Steel Company, Pomeroy, Meigs county. Built in 1847; 3 double and 11 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls; product, band, hoop, and refined iron; annual capacity, 12,000 net tons. Formerly called Crescent Iron Works.

Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth, Scioto county, Ohio. Built in 1832; 19 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 2 hammers; iron products, boiler plate, tank plate, sheet iron, bar and hoop iron, railroad spikes, small T rails, splice bars, and bolts; annual capacity, 11,000 net tons. One 10-gross-ton Siemens open-hearth steel furnace, built in 1879; steel products, boiler plate, spring steel, etc.; annual capacity, 4,500 net tons ingots. Idle and for sale.

Riverside Iron and Steel Company, John S. Conner, Assignee, Cincinnati. Rolling mill at Riverside, Hamilton county. Built in 1880; greatly enlarged in 1882; 10 single puddling furnaces, 8 heating furnaces, 3 box annealing furnaces, pair furnaces, one 4-ton hammer, one muck and billet train, one plate train, (with one set 7-foot and one set 62-inch chill rolls,) and 2 sheet trains; specialty, flange bloom boiler

plate and heads, boiler steel, tank iron, and light and heavy sheet iron; annual capacity, 12,000 net tons of boiler and tank iron, boiler steel, and heavy sheet iron, and 40,000 bundles, or 3,000 net tons, of light sheet iron.

Spaulding Iron Company, Brilliant, Jefferson county. Rolling mill started in September, 1883, and first nails cut January 1, 1884; 20 single puddling furnaces, 3 heating furnaces, two being Smith's improved gas heating furnaces, 4 trains of rolls, one hammer, and 78 nail machines; product, nails; annual capacity, 240,000 kegs. Use natural gas for fuel. D. Spaulding, President; C. H. Spaulding, Vice-President and Secretary; Thomas B. Taylor, Superintendent.

Standard (The) Iron Company, Bridgeport, Belmont county. Built in 1882-3, and put in operation April 1, 1883; 9 single puddling furnaces, 4 heating furnaces, and 6 trains of rolls (five 20 and one 22-inch); product, sheet iron and sheet steel, plain or corrugated, and galvanized iron; annual capacity, 6,000 net tons. Use natural gas for fuel. L. S. Delaplain, President; W. T. Graham, Secretary.

Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Main office at 111 Water st., Pittsburgh, Pa. Mill built in 1873 to make tinplate; remodeled in 1880 by present owners; 8 single puddling furnaces, 2 heating furnaces, 4 pair and sheet furnaces, 3 annealing furnaces, and two 22-inch trains of rolls; product, plate and sheet iron; annual capacity, 3,000 net tons. Fuel used, natural gas exclusively. P. F. Smith, President and Manager; Richard G. Wood, Vice-President; Alan W. Wood, Secretary and Treasurer.

Number of rolling mills and steel works in the Ohio river counties: 21. Of these 4 make Bessemer steel, 2 make open-hearth steel, and one makes crucible steel.

Total number of rolling mills and steel works in Ohio: 58 completed, and 4 building. Of these 6 make Bessemer steel, 9 make open-hearth steel, and one makes crucible steel.

INDIANA.

Etna Iron and Steel Works, 161 La Salle st., Chicago, Illinois. Works at Crown Point, Lake county, Indiana, built in 1886; one cementing furnace, crucible steel department with one hole, and one small open-hearth steel furnace; product, steel castings, architectural and building work, beams, girders, etc.; also, steel heating furnaces for buildings. Intend erecting two 18-ton open-hearth steel furnaces and a train of plate rolls, 112 inches wide. Jean L. Pfau, President; J. Louis Pfau, Jr., Secretary and Manager; T. A. Muzzall, Superintendent.

Aurora Iron Company, Aurora, Dearborn county. Works first put in operation by this company June 15, 1887; 10 single puddling furnaces, 2 heating furnaces, one muck and one sheet train of rolls, and one

hammer; product, light sheet iron; annual capacity, 3,500 net tons. Julius Severin, President; C. J. Severin, Secretary; Emil Severin, Treasurer; Eugene Severin, Manager. These works formerly formed part of the works of the Cobb's Iron and Nail Company.

Central Iron and Steel Company, Brazil, Clay county. Built in 1882-3, and first put in operation January 12, 1883; 9 double puddling furnaces, 7 heating furnaces, 3 trains of rolls, (one 10 and two 20-inch,) and two 4-ton hammers; product, merchant bar iron, light T rails, car axles, and forgings; special attention given to car and bridge specifications; annual capacity, 12,000 net tons. Brand, "Central." Major Collins, President and Manager; Charles Minshall, Secretary and Treasurer. *See Furnaces.*

Cobb's Iron and Nail Company, Aurora, Dearborn county. Built in 1875-8; 4 heating furnaces, one 20-inch train of rolls, and 50 nail machines; product, square cut nails, produced from Cobb's patent nail-plate pile of wrought-iron scrap and old iron or steel rails, and cut on the Haddock automatic machine; annual capacity, 150,000 kegs. Brand, "Cobb's Wrought-Iron Square Cut Nails." (Also have nut, bolt, and washer machinery, not now in operation.) O. P. Cobb, President; John Cobb, Vice-President; Frank D. Cobb, Secretary and Treasurer; W. H. Cobb, Assistant Secretary, purchasing agent, and salesman; John Black, Superintendent.

East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county. Built in 1886-7; 4 Smith heating furnaces, 2 trains of rolls, (22-inch slab and 22-inch nail plate,) 101 cut-nail machines, and two 3-ton Bessemer converters; first blow in steel works made November 22, 1887; product, steel nails, nail slabs, tank-plate slabs, and billets; annual capacity, 36,000 net tons of steel and 300,000 kegs of nails. Alexander Glass, Secretary and General Manager; B. Walker Peterson, Superintendent.

Greencastle Iron and Nail Company, Greencastle, Putnam county. Put in operation in January, 1868; 4 double and 8 single puddling furnaces, 3 heating furnaces, one annealing furnace, two 18-inch trains of rolls, and 45 nail machines; product, iron nails and spikes; annual capacity, 100,000 kegs. J. F. Darnall, President; G. H. Brown, Secretary and Treasurer; H. M. Thomas, Superintendent of works. Selling agent, E. A. More, St. Louis.

Indianapolis Rolling Mills, Indianapolis Rolling Mill Company, Indianapolis, Marion county. Built in 1857; 4 double and 2 single puddling furnaces, 8 heating furnaces, and 3 trains of rolls; product, light and heavy rails; annual capacity, 30,000 net tons; idle in 1887. Finishing part of steel rail mill built in 1881-2; capacity, 300 net tons of steel rails in twenty-four hours. Open-hearth steel works built in 1886-7; two 15-gross-ton Siemens furnaces; first steel made in May, 1887; product, steel for rails and other manufactures. Aquilla Jones, Pres-

- ident; John Thomas, Treasurer; W. H. Thomas, Assistant Treasurer; S. W. Morgan, Secretary and Superintendent.
- New Albany Forge and Rolling Mill Company, New Albany, Floyd county. Forge built in 1869; rolling mill added in October, 1887; one double puddling furnace, 2 heating furnaces, 3 forge fires, 2 trains of rolls, (one 18 and one 21-inch,) and 6 hammers; product, car axles, shafting, bars, channels, and beams; annual capacity, 5,000 net tons of axles, 400 tons of shafting, and 8,000 tons of bars, etc. Charles Sackett, President; George E. Sackett, Secretary and Treasurer; W. H. Stephens, Superintendent of rolling mill; J. T. Wright, Superintendent of forge.
- New Albany Rail Mill Company, New Albany, Floyd county. Built in 1864; 5 double and 6 single puddling furnaces, 5 forge fires, 11 heating furnaces, 3 spike machines, and 4 trains of rolls; product, T rails, (8 to 65 lbs.,) tram rails, street rails, bars, angles, fish-plates, spikes, washers, steel channels for cars, etc.; steel slot beams for cable roads a specialty; annual capacity, 35,000 net tons. C. W. DePauw, President; N. T. DePauw, Vice-President; Albert Trinler, General Manager.
- Ohio Falls Iron Works, New Albany, Floyd county. Built in 1866; 15 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (8-inch guide, 16-inch bar, and 18-inch muck); product, bridge, bar, plow, and stay-bolt iron; annual capacity, 10,000 net tons. Peter R. Stoy, Vice-President, Secretary, Treasurer, and General Manager.
- Schulte, Nehring & Co.'s Malleable Iron and Steel Works, Evansville, Vanderburgh county. Building steel works to contain two 10-pot melting holes, 4 heating furnaces, 4 forge fires, and 6 hammers; product, crucible soft-steel castings. Charles Schulte, President; William Nehring, Superintendent; Frank Lohoff, Secretary.
- Terre Haute Iron and Nail Works, Terre Haute, Vigo county. Built in 1868; destroyed by fire September 19, 1873, but rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double and 16 single puddling furnaces, 2 scrap and 4 heating furnaces, 144 nail machines, and 2 trains of rolls; product, iron and steel nails; annual capacity, 400,000 kegs. Brands, "Terre Haute," "Superior," and "Selected." F. Nipert, President; S. L. Bridwell, Secretary; H. S. Deming, Treasurer.
- Wabash Iron Company, Terre Haute, Vigo county. Completed in January, 1874; 15 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 18, and one 20-inch); product, all kinds of bar and guide iron, and light T rails; annual capacity, 12,000 net tons. Brand, "Wabash." A. J. Crawford, President; J. P. Crawford, Secretary, Treasurer, and Manager.
- Number of rolling mills and steel works in Indiana: 12 completed, and one building. Of these one makes Bessemer steel, 2 make open-hearth steel, one makes blister and crucible steel, and one crucible plant is being built.

ILLINOIS.

Belleville Nail Company, Belleville, St. Clair county. Built in 1869-70; remodeled in 1886-7; 5 heating furnaces, 2 trains of rolls, and 76 nail machines; product, cut nails; annual capacity, 150,000 kegs. Bessemer steel works built in 1886-7; two 4-gross-ton converters; first blow made August 6, 1887; product, steel for nails. Brand, "Waugh Steel Works." William W. Waugh, President; J. C. Waugh, Vice-President; Robert F. Waugh, Secretary and Treasurer; J. J. Carey, Manager. Selling agents, O. W. Meyenburg & Co., St. Louis.

Belleville Steel and Iron Nail Works, Belleville. Built in 1885-6; 2 heating furnaces, one 22-inch train of rolls, and 60 nail machines; product, iron and steel nails. James M. Hay, President; George H. Owen, Secretary; B. Hartmann, Treasurer.

Calumet Works, Calumet Iron and Steel Company, First National Bank Building, Chicago. Works at Cummings, Cook county. First put in operation in August, 1876; 24 double puddling furnaces, 2 scrap and 5 heating furnaces, 4 trains of rolls, (9, 14, 20, and 22-inch,) and 132 nail machines; operated with the Siemens gas furnace; product, merchant bar iron and iron and steel nails; annual capacity, 20,000 net tons of bar iron and 300,000 kegs of nails. Four 4-gross-ton open-hearth steel furnaces added in 1882; made first steel in October, 1882; product, steel for nails, merchant bar, and steel castings; annual capacity, 20,000 net tons. Brand, "Calumet." D. P. Eells, President; R. H. Lewis, Vice-President and General Manager; John M. Brown, Secretary and Treasurer.

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. Building a Bessemer plant, to contain one 2-ton converter, to be completed in December, 1887; 2 Smith gas heating furnaces; one small blooming train; product, nail slabs and billets; daily capacity, 75 net tons. S. M. Warner, President; E. S. Condit, Vice-President; A. D. Bailey, Secretary; F. Kohl, Treasurer; and M. H. Monkhouse, Superintendent.

Chicago Crucible Steel Casting Company, 1326 Indiana avenue, Chicago. Built in 1886, and first steel made November 1, 1886; six 4-pot steel-melting holes; product, ingots and steel castings of all descriptions; annual capacity, 700 net tons. Enlarging works to contain 21 steel-melting holes. Dr. J. W. Chisholm, President; William Chambers, Secretary and Manager; G. W. A. Geddes, Treasurer.

Chicago Forge and Bolt Company, 234 South Clark st., Chicago. Rolling mill built in 1886; one heating furnace and one 8-inch train of rolls; product, small rounds and flats. A. Egerton Adams, President;

- Frederick M. Steele, Secretary; Francis King, Treasurer; C. Weatherson, Superintendent.
- Chicago Splice Bar Mill, Morris Sellers & Co., 6 Ashland Block, Chicago. Built in 1878; one forge fire, 3 heating furnaces, and 2 trains of rolls; product, "Samson" splice bars; annual capacity, 12,000 net tons. Howard Greer, Superintendent.
- Chicago Steel Works, 806 Noble st., Chicago. Built in 1873; 9 heating furnaces, 3 forge fires, and 2 trains of 3-high 14-inch rolls; manipulate Bessemer steel rail ends; product, tires, plow beams, harrow teeth, springs, steel cultivator sleeves, shovel backs, and squares, diamonds, ovals, tees, and shapes for agricultural implements; annual capacity, 15,000 net tons. C. P. Buckingham, President; E. Buckingham, Vice-President; J. H. Buckingham, Secretary and selling agent; E. H. Buckingham, Treasurer and Superintendent.
- Chicago Tyre and Spring Works, 94 Washington st., Chicago. Works at Melrose, Cook county. Rolling mill built in 1881-2; one heating furnace and one train of tire rolls; product, steel locomotive tires made from imported blooms. Spring works have furnaces, rolls, and machinery for railroad springs. C. H. Ferry, Manager.
- Fowler Rolling Mill, Fowler Rolling Mill Company, 185 Dearborn st., Chicago. Built in 1882; one forge fire, 2 heating furnaces, and one 9-inch train of rolls; product, "Fowler" railroad spikes; annual capacity, 80,000 kegs. Sidney A. Kent, President; William J. Watson, Vice-President; H. W. Fowler, Secretary, Treasurer, and General Manager.
- Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Works, Stony Island avenue and Ninety-fifth st. Built in 1887; double gas heating furnace, with trains of rolls and machinery for rolling solid steel car-wheel blanks into finished integral steel car wheels; annual capacity, 75,000 car wheels. H. W. Fowler, President, Secretary, and Treasurer; C. H. McCormick, Vice-President.
- Haxtun Steam Heater Company, Kewanee, Henry county. Built in 1883, and put in operation in November, 1883; 4 double-double puddling furnaces, 2 heating furnaces, two 16-inch trains of rolls, and one 5,000-pound hammer; product, skelp iron, used by the company in the manufacture of steam-heater pipe; annual capacity, 15,000 net tons. The company manufactures everything used in the construction of steam-heating apparatus for all kinds of buildings. W. E. Haxtun, President; J. H. Pierce, Secretary; E. E. Baker, Treasurer.
- Joliet Steel Works, Joliet Steel Company, Home Insurance Building, Chicago. Works at Joliet, Will county. Built in 1870; steel works made first blow January 26, 1873, and the first steel rail March 15, 1873; the converting department has two 8-gross-ton converters; annual capacity, 235,000 net tons of Bessemer steel ingots. Steel rail mill has 6 heating furnaces, one 36-inch blooming train, one 23-inch

rail train, and a Sellers 3-ton hammer; annual capacity, 210,000 net tons of Bessemer steel rails. Alexander J. Leith, President, 11 Pine st., New York City; J. C. Stirling, Secretary, Chicago; W. R. Stirling, Treasurer, Chicago; H. S. Smith, General Superintendent, Joliet. *See Furnaces.*

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 151 Insurance Block, Milwaukee, Wis. Two plants in Illinois, styled the Chicago Works and the South Chicago Works. Chicago Works, W. L. Potter, General Superintendent, located at Chicago, on the north branch of the Chicago river, at the foot of Waubansia avenue, built in 1857; one sextuple and 8 quadruple puddling furnaces, equal to 38 single furnaces, 23 heating furnaces, 10 trains of rolls, and one hammer; Bessemer steel works have two 6-gross-ton converters and all the appliances for making rails; made their first blow April 10, 1872; first steel rail rolled May 24, 1865, from steel made at Wyandotte, Michigan; product, Bessemer steel ingots, iron and Bessemer steel rails, and steel beams; annual capacity, 156,000 net tons ingots, 125,000 tons steel rails, 60,000 tons iron rails, and 50,000 tons steel beams, (which latter would come out of rail capacity.) South Chicago Works, E. C. Potter, Superintendent, located at South Chicago, made their first blow June 14, 1882; contain three 10-gross-ton Bessemer converters, 4 Siemens heating furnaces, one 3-high 40-inch blooming train, and one 2-high reversing finishing train of rolls; product, Bessemer steel ingots and rails; annual capacity, 330,000 net tons ingots and 300,000 tons rails. All rails branded with the company's initials. This company has 3 rail mills, one merchant mill, and 8 blast furnaces. O. W. Potter, President, Chicago; Nathaniel Thayer, Vice-President, Boston, Mass.; R. C. Hannah, Secretary, Chicago; John C. Parkes, General Manager. General office, Chicago. *For details in addition to this description see Illinois Furnaces and Wisconsin Furnaces and Rolling Mills.*

Plano Steel Works, McDowell Manufacturing Company, lessee, Plano, Kendall county. First put in operation January 1, 1885; two heating furnaces and one 12-inch train of rolls; product, steel wheels, of various kinds, and shapes for agricultural implements, rolled from steel rail scrap; annual capacity, 4,000 net tons. Malcolm McDowell, President; Gordon McDowell, Manager and selling agent.

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, 27,000 net tons of car and merchant iron. Chicago office, Pullman Building. A. S. Weinsheimer, Treasurer; Samuel Job, Superintendent.

Rock Island Arsenal, Rock Island, Rock Island county. One heating furnace, one 5,000-pound hammer, and one 14-inch train of rolls;

product, bar iron, light T rails, shafting, and heavy forgings. Built to dispose of accumulated wrought-scrap iron and to furnish material needed in the construction of the arsenal.

Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. New York office, 10 Wall st.; Chicago office, 115 Dearborn st. Bessemer steel works, built in 1886-7; two 5-gross-ton converters; first blow made September 8, 1887; annual capacity, 150,000 net tons of ingots. Open-hearth steel works contain two 20-gross-ton Siemens-Pernot furnaces and one Pernot furnace for dephosphorizing pig metal; made the first steel ingot February 9, 1880; annual capacity, 20,000 net tons. Puddle mill first put in operation in June, 1872; 8 double puddling furnaces and one 18-inch train of rolls. Blooming mill contains one 3-high 30-inch blooming train of rolls, with hydraulic tables, put in operation in 1879, and one 2-high 32-inch reversing train, put in operation in 1887, to work in direct connection with the rail mill. Rail mill put in operation in 1872, remodeled in 1887; one 23-inch train of finishing rail rolls, working in direct connection with the 32-inch blooming mill train; annual capacity, 150,000 net tons of rails. Bar mills contain 4 trains of rolls, (12, 16, 18, and 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 net tons. Charles Ridgely, President; William Barret Ridgely, Vice-President; Franklin Ridgely, Secretary; and John Griffiths, Superintendent.

Tudor Iron Works, Third and St. Charles sts., St. Louis, Mo. Works at East St. Louis, St. Clair county, Ill. Put in operation in January, 1873; one single and one double puddling furnace, one scrap furnace, 9 heating furnaces, 5 trains of rolls, 6 spike machines, 2 bolt headers, 4 bolt cutters, 2 nut tappers, and 5 nut machines; reroll Bessemer steel; product, railroad splices, T rails, bolts, and spikes; annual capacity, 35,000 net tons. Brand of spikes, "Tudor." T. A. Meysenburg, President; B. S. Adams, Secretary; George S. Edgell, Treasurer.

Union (The) Steel Company, 302 First National Bank Building, Chicago. Works at 3179 Ashland avenue; original mill built in 1863; original Bessemer steel works made their first blow July 26, 1871; Bessemer steel works and rail mill rebuilt in 1885-6; two 10-gross-ton converters, 4 cupolas, 4 spiegel cupolas, 35-inch 3-high blooming mill, 2 gas ingot-heating furnaces, one gas bloom-heating furnace, and one 25-inch 3-high rail train; product, Bessemer steel rails. (Also, merchant bar, plate, rod, and wire mills; 7 heating furnaces, one 22-inch plate mill, one 20-inch billet mill, one 18-inch bar mill, and one wire-

rod mill; not now in use.) Jay C. Morse, President; H. A. Gray, Secretary and Treasurer; Robert Forsyth, Manager; Robert Spencer, General Agent. *See Furnaces.*

Western Nail Company, Belleville, St. Clair county. Rolling mill and nail works first put in operation in September, 1882; steel works made first blow January 21, 1886; two 3-gross-ton Clapp-Griffiths steel converters, 2 ordinary heating furnaces, one Smith gas heating furnace, one 23½-inch slab train, one 21-inch 3-high nail-plate train, and 154 nail machines; product, steel nails; annual capacity, 25,000 net tons steel ingots and 350,000 kegs of nails. W. H. Powell, President and General Manager; C. Reinecke, Vice-President and Treasurer; H. L. Powell, Secretary; E. B. Powell, Superintendent of the works.

Western Steel Company, 58 Dearborn st., Chicago. Works at Parkside, Cook county. Built in 1881; 4 heating furnaces, one train of rolls, and 2 hammers; product, "Seymour" rolled steel horse shoes; annual capacity, 1,500 net tons. James D. Sturges, President; J. W. Helmer, Secretary and Treasurer; J. C. Blewett, Superintendent; George R. French, General Agent.

Number of rolling mills and steel works in Illinois: 23. Of these 6 make Bessemer steel, one makes Clapp-Griffiths steel, 2 make open-hearth steel, one makes crucible steel, and one Bessemer steel plant is being built.

MISSOURI.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Built in 1879; 3 single puddling furnaces, 2 Siemens and 2 coal heating furnaces, 10 charcoal knobbling fires, 3 trains of rolls, and 3 hammers; product, stamping sheet iron for "granite iron ware" and galvanizing sheet; annual capacity, 5,000 net tons. F. G. Niedringhaus, President; William F. Niedringhaus, Secretary and Manager.

Helmbacher Forge and Rolling Mills Company, corner Barton and De Kalb sts., St. Louis. Works, South Second st., between Lami and Barton sts. Built in 1858; 7 single puddling furnaces, 10 heating furnaces, 2 trains of rolls, (one 10 and one 19-inch,) and 11 hammers (ranging from 8-ton double-acting to 60-pound helve); product, bar, rod, band, and angle iron, car axles, coupling links and pins, light T rails from 8 to 20 lbs., and all kinds of iron and steel forgings for railroad and steamboat use, and for machine shops; specialties, shafts, railroad car axles, links, and pins; annual capacity, 6,000 net tons of axles and forgings and 6,000 tons of bar iron, links, and pins. James Green, President and Treasurer; A. Helmbacher, Superintendent; G. L. Goetz, Secretary. Agents, John S. Brewer, 147 Van Buren st., Chicago; H. C. McNair, Drake's Block, St. Paul, Minn.

Kansas City Bolt and Nut Works, Kansas City, Jackson county. Building a rolling mill and bolt, nut, and spike factory, to be completed early in 1888; product, bar, band, and bolt iron; also bolts, nuts, spikes, etc. Branch of the Reading Bolt and Nut Works, of Reading, Pa.

Laclede Rolling Mills, Chouteau, Harrison and Vallé Iron Company, 204 North Third st., St. Louis. Built in 1850; rebuilt in 1879; 20 single puddling furnaces, 4 Siemens and 5 coal heating furnaces, one scrap furnace, 4 knobbling fires, 4 trains of rolls, 2 hammers, 2 bolt headers, 2 spike machines, 4 screw cutters, 2 machines for making washers, and 2 nut tappers; product, bar, sheet, and plate iron, plate and sheet steel, blooms, angle and tee iron, 8 to 25-lb. T rails, 20 to 50-lb. flat rails, spikes, nuts, bolts, and washers; also, cold-rolled sheet iron; annual capacity, 20,000 net tons. C. C. Maffitt, President; Edwin Harrison, Vice-President; Paul A. Fusz, Secretary.

St. Louis Steam Forge and Rolling Mills, A. McDonald & Brother, corner Main and Miller sts., St. Louis. Built in 1862; 3 double puddling furnaces, 6 forge fires, 8 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 6 hammers; product, bar iron, car axles, and forgings; annual capacity, 12,000 net tons of axles and 2,500 tons of bar iron.

Vulcan Works, Western Steel Company, lessee, St. Louis. Works at South St. Louis. Built in 1872 as an iron rail mill; Bessemer steel works erected in 1875-6; made their first blow September 1, 1876; two 7-gross-ton converters, 4 pig-iron cupolas, 4 spiegel-melting furnaces, 40 gas producers, 10 Siemens heating furnaces, one 3-ton hammer, one 33-inch blooming train, one 24-inch rail train, and one 24-inch billet train; product, steel slabs, blooms, rails, and billets; annual capacity, 100,000 net tons ingots. A. M. Wilcox, President and Treasurer; C. F. Stuart, Secretary. *See Furnaces.*

Number of rolling mills and steel works in Missouri: 5 completed, and one building. Of these one makes Bessemer steel.

IOWA.

Iowa Rolling Mill Company, Burlington, Des Moines county. First put in operation in 1885; enlarged in 1887; 2 puddling furnaces, one Smith and 2 Swindell gas heating furnaces, crocodile squeezer, and 2 trains of 3-high rolls (9 and 16-inch); product, all kinds of merchant bar iron—rounds, half rounds, squares, flats, and bands, car irons, and agricultural irons of all kinds; specialty, small shapes; annual capacity, 10,000 net tons. Theodore Guelich, President; J. W. Price, Vice-President; E. M. Wilson, Secretary; John T. Remey, Treasurer; M. C. Williams, General Manager.

Number of rolling mills in Iowa: one.

MICHIGAN.

Baugh Steam Forge Company, No. 1 Newberry and McMillan Building, Detroit, Wayne county. Works at Springwells, about three miles west of Detroit. Forge built in 1870, rolling mill in 1877; 12 heating furnaces, 6 hammers, and 3 trains of rolls (9, 16, and 20-inch); product, car axles, links and pins, shafting, and bar iron. James McMillan, President; Hugh McMillan, Vice-President; John B. Baugh, General Manager; Samuel A. Baugh, Superintendent; W. K. Anderson, Treasurer; R. D. Field, Secretary.

Detroit Steel and Spring Works, First and Larned sts., Detroit. First put in operation in May, 1882; 7 Swindell and 4 double Weber heating furnaces, 2 trains of rolls, (one 9 and one 18-inch,) and 8 hammers; product, shapes, rolled from purchased steel; annual capacity, 8,000 net tons. Crucible steel department made first steel in February, 1884; one Siemens gas pot furnace and six steel-melting holes; can use 30 pots at each heat; product, tool and spring steel; annual capacity, 1,500 net tons. Alexander De Lano, President; Charles P. Choate, Vice-President; H. R. Newberry, Secretary and Treasurer.

Eureka Iron and Steel Works, No. 21 Newberry and McMillan Building, Detroit. Works and main office at Wyandotte, Wayne county. Built in 1855; 5 double and 5 single puddling furnaces, 12 forge fires, 11 heating furnaces, 6 trains of rolls, (8, 10, 18, 20, 24, and 30-inch,) and one 5-ton hammer; product, "Wyandotte" boiler plate and tank iron and bars; annual capacity, 9,000 net tons plates and 24,000 tons bars. Formerly called Wyandotte Rolling Mills. W. K. Muir, President, S. D. Miller, Vice-President and Secretary, and George Hendrie, Treasurer, Detroit; J. S. Van Alstyne, Agent, and Thomas D. Evans, Superintendent, Wyandotte. *See Furnaces.*

Number of rolling mills and steel works in Michigan: 3. Of these one makes crucible steel.

WISCONSIN.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Ill., and 151 Insurance Block, Milwaukee, Wis. Milwaukee works at Bay View, near Milwaukee, Milwaukee county. W. B. Parkes, Superintendent. Built in 1868 and 1874; 8 quadruple puddling furnaces, 19 coal and 5 Siemens heating furnaces, 7 trains of rolls, (one 8, one 9, one 12, two 18, one 21, and one 22-inch,) and one hammer; product, rails, merchant bar iron, fish-plates, car links and pins, and horse shoes; annual capacity, 50,000 net tons of bar iron and rails and 25,000 tons of fish-plates, etc. Nail mill added in 1884; 100 nail machines; product, iron and steel nails; annual capacity, 300,000 kegs. *See Furnaces. See Illinois Furnaces and Rolling Mills.*

Number of rolling mills in Wisconsin: one.

MINNESOTA.

Capital Iron Works, St. Paul, Ramsey county. Built in 1885-6; 2 heating furnaces, one double busheling furnace, and one 9-inch and one 16-inch train of rolls; product, bar iron, made from scrap iron; annual capacity, 12,000 net tons. David Morgan, Manager. Idle in 1887.

Standard Rolling Mill, Strothman Brothers, Minneapolis, Hennepin county. Built in 1884, and first put in operation July 1, 1884; one heating furnace and one 8-inch train of rolls; product, flat, round, and square bar iron; annual capacity, 1,200 net tons. Operated in connection with the Standard Iron Works machine shop. Idle in 1887.

Number of rolling mills in Minnesota: 2.

KANSAS.

Western Iron Company, Rosedale, Wyandotte county. Built in 1875; 11 heating furnaces, 2 hammers, one nut and 6 spike machines, 3 trains of rolls, (9, 18, and 20-inch,) and a set of universal rolls attached to the 20-inch train; product, mine and street rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc.; annual capacity, 15,000 net tons. James H. Anderson, President, Keokuk, Iowa; A. St. J. Newberry, Secretary and Treasurer, Cleveland, Ohio; D. E. Jones, Superintendent, Rosedale. Idle.

Number of rolling mills in Kansas: one.

NEBRASKA.

Union Steel Nail Company, Omaha, Douglas county. Works built in 1877; first started by present company May 25, 1886; 2 heating furnaces, 2 trains of rolls, (18 and 22-inch,) and 32 nail machines; product, "Union" nails, made from blended steel and iron; annual capacity, 100,000 kegs. William Haven, President; George T. Walker, Vice-President; W. N. McCandlish, Secretary. Idle until a better location can be secured.

Number of rolling mills in Nebraska: one.

COLORADO.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. Works at Denver, Arapahoe county, and at South Pueblo, Pueblo county. The works at Denver consist of a rolling mill purchased of the Denver Rolling Mill Company in 1880, having been built in 1878; 5 heating furnaces and 2 trains of rolls; product, bar iron, iron rails, and splice bars; annual capacity, 12,000 net tons. The works at South Pueblo consist of Bessemer steel works, steel rail mill, puddle mill,

merchant bar mill, and nail factory; built in 1881-2; converting department made its first blow April 11, 1882; two 5-gross-ton Bessemer steel converters, 4 Siemens heating furnaces, one 3-high 35-inch blooming train, one 3-high 23-inch rail train, 3 Siemens double-double puddling furnaces, one 20-inch muck train, one 19-inch bar train, one 9-inch guide train, and one 2-high 22-inch nail-plate train, heating and annealing furnaces, 27 nail machines, and railroad spike and bolt and nut machines; product, steel rails, bar iron, mine rails, splice bars, steel cut nails, railroad spikes, bolts, nuts, and cast iron pipe; annual capacity, 50,000 net tons of steel rails, 12,000 net tons of bar iron, mine rails, and splice bars, 100,000 kegs of nails, and 30,000 kegs of railroad spikes, bolts, and nuts. Henry E. Sprague, President, 41 and 43 Wall st., New York; A. H. Danforth, Vice-President and General Manager, and W. L. Graham, Secretary and Treasurer, South Pueblo; W. G. Brown, Sales Agent, Denver; D. N. Jones, General Superintendent of steel works, South Pueblo. *See Furnaces.* Number of rolling mills and steel works in Colorado: 2. Of these one makes Bessemer steel.

WYOMING TERRITORY.

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

Number of rolling mills in Wyoming Territory: one.

CALIFORNIA.

Central Pacific Railroad Rolling Mill, Central Pacific Railroad 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, 8,000 net tons. Brand, "C. P. R. R." A. J. Stevens, General Manager of the mill.

Judson Manufacturing Company, Oakland, Alameda county. Built in 1882; 4 coal heating furnaces, one 4-door 7 x 18 Smith gas heating furnace, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, bar iron and tack plate; annual capacity, 12,000 net tons of finished iron. Brand, "Judson." Egbert Judson, President; D. Henshaw Ward, Vice-President and General Manager; C. B. Morgan, Secretary; First National Bank, Treasurer. 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; 3 forge fires, 4 heating furnaces, one train of 3-high 14-inch rolls, one train of rolls for nail plate, one hammer, 96 nail machines, and 4 wire-nail machines; product, wire nails and cut nails; annual capacity, 275,000 kegs. Make nails of blended or combined iron and steel as well as of iron alone. Hermann J. Sadler, President and Treasurer; P. A. Wagner, Vice-President; C. J. R. Buttlar, Secretary; William Wright, General Agent.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 202 Market st., P. O. Box 2,032, San Francisco. Put in operation July 25, 1868; 4 single puddling and 17 heating furnaces, 6 trains of rolls, (one 8, one 10, one 12, and three 18-inch,) 4 spike and 2 rivet machines, 5 bolt headers, one pointer, 5 hot-press nut machines, 13 punching and straightening presses, 9 steam hammers, and 2 belt hammers; product, bar iron, angle iron, shafting, 12 to 60-lb. iron and steel rails, rail road, 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. Open-hearth steel department added in 1884; one 5 and one 18-gross-ton Siemens-Martin furnace; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. Propose erecting a large train of rolls for rolling heavy structural shapes, plates, and deck beams. A horse-shoe company has been formed to be run in connection with these works, and of which this company holds control. William Alvord, President; L. B. Benchley, General Manager; C. M. Keeney, Secretary; Patrick Noble, Superintendent. Number of rolling mills and steel works in California: 4. Of these one makes open-hearth steel.

PROJECTED.

The Moss Bay Hematite Iron and Steel Company, of Workington, England, contemplates erecting iron and steel works near Tacoma, Washington Territory.

UNITED STATES.

Total number of rolling mills and steel works in the United States: 433 completed, and 12 building. Of these 35 make Bessemer steel, and 3 Bessemer steel plants are being built; 8 make Clapp-Griffiths steel, and one Clapp-Griffiths steel plant is being built; 50 make open-hearth steel, and 3 open-hearth steel plants are being built; 41 make crucible steel, and one crucible steel plant is being built; 8 make blister steel; and 2 make special steel castings. A rolling mill in the United States may embrace more than one train of rolls under one management.

RECENTLY ABANDONED ROLLING MILLS.

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.

Fall River Iron Works, Fall River, Bristol county. Built in 1822, and rebuilt in 1842; product, bars and nails; mill abandoned and machinery sold in 1887.

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.

Parker Mills, Wareham, Plymouth county. Built in 1815; product, nails; dismantled in 1887.

Somerset Iron Works, Somerset, Bristol county. Built in 1855; sold to Mount Hope Iron Works in 1887.

Tisdale Nail Works, East Wareham, Plymouth county. Built in 1836; product, bar iron, nails, and tack plate.

United States Navy Yard, Charlestown. Mill built in 1868; product, bar iron.

Weymouth Iron Company, East Weymouth. Built in 1836; product, nails; company failed in 1886, and the works will probably never run again.

RHODE ISLAND.

Providence Iron Company, Providence. Built in 1845; abandoned in 1880.

CONNECTICUT.

Birmingham Rolling Mill, Peck, Stow, and Wilcox Company, Birmingham, New Haven county. Built in 1843; product, bar iron; abandoned and machinery sold in 1887.

Greenwich Iron Works, James S. Lounsbury, 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, Sheldon & Co., Auburn, Cayuga county. Built in 1874; removed to Wilkesbarre, Pa., in 1886.
- Auburn Rolling Mill, E. D. Clapp Manufacturing Company, Auburn, Cayuga county. Built in 1880, and burned January 4, 1886; product, merchant bar.
- Buffalo Iron and Nail Works, Buffalo, Erie county. Built in 1847; abandoned in 1880.
- Delano Iron Works, Syracuse, Onondaga county. Built in 1865; product, rails, fish-plates, spikes, and merchant bars; dismantled in 1878.
- Lake Champlain Nail Works, Dannemora, Clinton county. Built in 1853; abandoned in 1877.
- Napanoch Rolling Mill, Napanoch Rolling Mill Company, Napanoch, Ulster county. Started up in February, 1880, after 8 years' idleness. Idle since May, 1881, and dismantled.
- Peru Steel and Iron Company, Clintonville, Clinton county. Built in 1824; 2 heating furnaces and 3 trains of rolls.
- 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.
- Suffern, (James,) Suffern P. O., Rockland county. Built in 1850; product, bars.
- Troy Wire Mills, Troy. One 6-inch mill built in 1874, but only used for a short time; dismantled.
- Union Iron Works, Buffalo, Erie county. Built as an iron rail mill in 1862; product, rails, shapes, and plates; idle for a number of years, and dismantled in 1887.

NEW JERSEY.

- Bergen Iron Works, Jersey City. Built in 1852; product, plate iron and blooms. Dismantled in 1879.
- Camden Rolling Mill, Camden, Camden county. Annual capacity, 12,000 net tons of bar iron and 75,000 kegs of nails.
- Collier's Iron Works, William Collier, Paterson, Passaic county. Built in 1872; product, merchant bar and horse-shoe iron.
- Elizabethport Rolling Mill, Elizabethport, Union county. Built about 1870; product, bars, angles, etc; machinery removed in 1885.
- North River Rolling Mill, Alexander C. Durbin, Thirteenth and Henderson sts., Jersey City; product, fire-box and boiler plate; annual capacity, 3,000 net tons; dismantled in 1875.
- Rockaway Rolling Mill, Rockaway, Morris county. Built in 1822; burned in 1883.

PENNSYLVANIA.

- Brady's Bend Iron Company, Brady's Bend, Armstrong county. Built in 1842; product, rails; dismantled in 1879.
- Carbon Rolling Mill, Weissport, Carbon county. Built in 1860-4, and rebuilt in 1872; product, merchant iron; will be dismantled.
- Colemanville Rolling Mill, Colemanville, Lancaster county. Burned in 1875.
- 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.
- Greenwood Rolling Mill, Tamaqua, Schuylkill county. Built in 1865; dismantled in 1887.
- Harrisburg Steel and Iron Works, Hummel, Fendrich & Co., Harrisburg. First put in operation October 16, 1881; product, horse-shoe steel and iron; dismantled in 1885, and machinery taken to Columbia.
- Hibernia Forge and Rolling Mill, Wagontown, Chester county. Forge built in 1792; mill added in 1837; abandoned in 1880.
- Lehigh and Franklin Wire Mills, Stewart & Co., Easton, Northampton county. Rolling mill built in 1837; product, wire rods, drawn into wire at the same establishment; rolls removed in 1884.
- 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.
- Shenango Iron Works, New Castle, Lawrence county. Built in 1848; product, bars, light T rails, sheets, bands, wrought spikes, and nails. Dismantled in 1885; nail machines taken to Youngstown, Ohio.
- Superior Rolling Mill, Pittsburgh. Built in 1865 to make rails; altered to make iron and steel structural material; dismantled in 1886.
- West Brandywine Iron Works, Coatesville, Chester county. Built in 1845; abandoned in 1880.

MARYLAND.

- Abbott Iron Works, Abbott Iron Company, P. O. Box 65, Baltimore. Plate mills built in 1851; rail mill built in 1865; dismantled in 1886.
- Baltimore Steam Forge and Rolling Mills, Trego, Thompson & Co., Baltimore. Built in 1853; product, bar iron and car axles.
- Canton Iron Works, Canton, Baltimore county. Built in 1878; product, refined merchant bar iron; dismantled in 1885.
- Mount Savage Iron Company, Mount Savage, Alleghany county. Built in 1839; dismantled in 1875.

DISTRICT OF COLUMBIA.

Equipment Iron Rolling Mill, Navy Yard, Washington. Built in 1878; forge and anchor shop built in 1858; product, bars, plates, and forgings; abandoned in 1887.

VIRGINIA.

Graham's Forge, Wythe county. Built in 1828; product, bar iron and nails; abandoned in 1881.

Lynchburg Iron Works, Lynchburg, Campbell county. Built in 1872; product, merchant bar and band iron, bolts, and nuts.

GEORGIA.

Georgia Iron Works, Atlanta, Fulton county. Built in 1865-6; product, iron rails and bar iron; burned September 21, 1881; dismantled.

Rome Iron Works, Empire Iron Company, Rome, Floyd county. Built in 1869; product, bar iron and nails; dismantled in 1881.

KENTUCKY.

Central Rolling Mill, B. Du Pont, Brook st., Louisville. Built in 1849. First called Louisville Rolling Mill.

Covington Rail Mill, James G. Kyle & Bro., Covington, Kenton county. Built in 1854; product, rails; dismantled in 1878.

TENNESSEE.

Memphis Rolling Mill, James Tranter, Cincinnati, Ohio. Mill at Memphis, Shelby county. Built in 1866; product, merchant bar, plow slabs, fish bars, and street rails; dismantled in 1879.

OHIO.

Alliance Rolling Mill, Alliance, Stark county. Built in 1867; product, rails; dismantled in 1878.

Ashtabula Rolling Mill, Ashtabula, Ashtabula county. Built in 1873-4; product, plates, sheets, spikes, etc.; dismantled in 1879.

Co-operative Nail Works Company, Steubenville, Jefferson county. Built in 1885-6; product, nails; 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.

Forest City Iron Works, Cleveland. Built in 1866-7; remodeled in 1882; product, bar iron; burned in August, 1886.

Grasshopper Iron Works, The Arms, Bell & Co., Youngstown. Built in 1876; product, bars, spikes, rivets, and nuts; burned in January, 1886.

Leetonia Nail and Bolt Company, Leetonia, Columbiana county: 26 nail machines and train for making nail plate.

Marietta Rail Mill, Marietta, Washington county. Built in 1867; product, rails, fish-plates, and bar and hoop iron; 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; product, plates and bars; dismantled in 1887.

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

Valley Iron Company, Cleveland. Built in 1874-5; product, bar iron. The mill was abandoned in 1880.

INDIANA.

Capital City Iron Works, Indianapolis. Product, bar iron; not in operation for many years.

Western Iron Company, Knightsville, Clay county. Built in 1868; product, muck bar; dismantled in 1879.

ILLINOIS.

Chicago Plate and Bar Mill, J. M. Ayer, 72 Washington st., Chicago. Product, plate and bar iron.

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; product, nails; removed to Omaha in 1879.

MISSOURI.

Harrison Wire Company, 816 High st., St. Louis. Built in 1873; product, wire rods; idle since 1884, and machinery removed in 1887.

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

Tudor Iron Works, St. Louis. Built in 1870; product, railroad spikes.

MICHIGAN.

Jackson Iron Manufacturing Company, Jackson, Jackson county. Built in 1872; dismantled in 1879; machinery removed to Springfield Iron Company's mill, Springfield, Ill.

Marquette Rolling Mill, Marquette and Pacific Rolling Mill Company, Marquette. Built in 1871; product, bar iron; idle since 1875.

KANSAS.

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

UTAH TERRITORY.

Ogden Iron Works, Ogden. Begun in 1875, and completed in 1882; removed to Colorado Coal and Iron Company's mill, South Pueblo, Colorado, in 1884.

RECENTLY ABANDONED STEEL WORKS.

- Adirondac Steel Works, Jersey City, New Jersey. Built in 1847; dismantled in 1885; product, crucible steel.
- American Cast Steel Company, Cleveland, Ohio. Built in 1878 to make steel by the Bechtold patent.
- Atlantic Steel Works, Richardson, Boynton & Co., 232 Water st., New York. Abandoned the manufacture of crucible steel in 1875.
- Calumet Tool Company, Chicago. Crucible steel works built in 1879.
- Chicago Sheffield Steel Works, 149 Fulton st., Chicago. Built in 1874-5; product, crucible steel.
- Cleveland Cast Steel Works, H. W. Foote, 145 Superior st., Cleveland, Ohio. Built in 1877 to make crucible steel castings.
- Cleveland Steel Company, Cleveland, Ohio. Built in 1880; product, crucible steel.
- Crucible Cast Steel Casting Company Limited, Pittsburgh. Built in 1875 to make crucible steel castings.
- Crucible Steel Casting and Metal Company, Louisville, Ky. Built in 1879-80; abandoned in 1882.
- Estate of G. F. Wilson, Providence, R. I. Product, open-hearth steel.
- Glenwood Steel Works, Glenwood Station, B. & O. R. R., Pittsburgh. Built in 1879; product, open-hearth steel.
- Goddard & Poulterer, Front and Laurel sts., Philadelphia. Started a crucible steel works in the Disston building in 1885, but abandoned it the same year.
- Joseph W. Howard Limited, corner Albany and Swett sts., Boston, Mass. First steel made in September, 1883; product, crucible steel castings.
- North River Steel Works, Thirteenth and Henderson sts., Jersey City, New Jersey. Built in 1875; product, crucible steel.
- Crucible Steel Company, 46 West Monroe st., Chicago. Works put in operation in 1885 and abandoned in 1886; rehabilitated and operated for a few days by Kramer & Kingsland in 1887; product, crucible steel castings. For sale.
- Pittsburgh Steel Works, Ross st. and First avenue, Pittsburgh. Built in 1845; product, crucible steel.
- Port Henry Steel and Iron Company Limited, Port Henry, N. Y. Built in 1885-6; product, Clapp-Griffiths steel; converter removed to Millvale Rolling Mill, Pittsburgh, in 1887.
- Read & Thaw, North and Irwin avenues, Allegheny City, Pa. Built in 1878; product, crucible steel castings.
- Solid Steel Casting Company, North Newark, Essex county, New Jersey. Built in 1884; product, crucible steel castings.

St. Albans Iron and Steel Works, St. Albans, Vermont. Built in 1873; product, open-hearth steel.

Trenton Iron Company, Trenton, New Jersey. One small experimental Bessemer converter, built in 1886; idle, and will probably never run again.

Washington Steel Works, Reading, Pa. Built in 1885; product, open-hearth and crucible steel castings; abandoned in 1885.

Wheeling Steel Works, Martin's Ferry, Ohio. Built in 1873-4; product, crucible steel.

FORGES.

NOTE.—Under this title are embraced all works which make wrought iron from ore. All direct processes are included under this head.

MAINE.

Thomes, (O. S.) Cumberland Centre, Cumberland county. Forge at Webb's Mills. Built in 1883; 3 fires. Idle and for sale.
Number of forges in Maine: one.

VERMONT.

East Middlebury Iron Works, Williams & Nichols, East Middlebury, Addison county. Rebuilt in 1880; 4 fires and one hammer; product, charcoal blooms for steel; annual capacity, 1,300 net tons. Idle since 1885.

Number of forges in Vermont: one.

NEW YORK.

ALL LOCATED IN THE LAKE CHAMPLAIN DISTRICT.

Altona Bloom Iron Works, G. W. & F. Palmer & Co., Alder Bend, Clinton county. Telegraph address, Altona. Two forges: One at Altona, built in 1868; 6 fires and one hammer; brand, "Altona;" one at Alder Bend, 4 miles from Altona, built in 1880; 6 fires; water-power; product, charcoal blooms for boiler plate and sheet iron, made from Chateaugay ore; annual capacity of each forge, 2,400 net tons.
Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Four works. Plattsburgh Iron Works were built at Plattsburgh in 1879 as a rolling mill; converted into a forge in 1883; 4 fires and one

- hammer. Chateaugay Lake Iron Works were built at Chateaugay Lake, Franklin county, in 1875; 16 fires and 3 hammers. Clayburgh Iron Works were built at Clayburgh, Clinton county, in 1844; rebuilt and enlarged in 1883; 7 fires and one hammer. Russia Iron Works were built at Moffittsville, Clinton county, in 1844; enlarged in 1883; 7 fires and one hammer. All run by water-power; product, charcoal blooms for general purposes, made from Chateaugay ore; total annual capacity, 12,000 net tons. Andrew Williams, 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.*
- Crown Point Iron Company, Ironville, Essex county. Main office, Crown Point. Built in 1828, rebuilt in 1879; 8 fires and one hammer; steam-power; product, charcoal blooms for steel; annual capacity, 2,400 net tons. *See Anthracite Furnaces.*
- Horicon Iron Company, 24 Cliff st., New York. Works at Ticonderoga, Essex county. Built in 1865; 6 fires and 2 steam hammers; product, charcoal blooms for steel. Cyrus Butler, President and Treasurer. Idle since 1883.
- Irona Forge, J. F. Reynolds, Irona, Clinton county. Built in 1868; 5 fires and one hammer; product, "Chateaugay" blooms, made from Chateaugay ore, intended wholly for steel. This forge has been idle since 1885.
- Keene Forge, W. F. & S. H. Weston, Keene, Essex county. Built in 1880; 6 fires and one hammer; water-power; product, charcoal blooms and billets for boiler plate and steel, made from Keene ore; brand, the letter W in a circle. Idle in 1887. *See Wilmington Forge.*
- Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; 4 fires and one hammer; water-power; product, charcoal blooms for best boiler plate; annual capacity, 2,000 net tons.
- Peru Steel Ore Company Limited, Clintonville, Clinton county. Built in 1837; 16 fires and 4 hammers; water-power; product, charcoal blooms for steel; annual capacity, 5,000 net tons. George H. Cleaves, President; A. W. Riley, Vice-President; Charles M. Hopkins, Secretary; M. A. Buck, General Manager.
- Peterburgh Iron Works, Peter Tremblay, Clayburgh, Clinton county. Forge at Peterburgh. Four fires and one hammer; water-power; product, charcoal blooms for steel. Idle in 1887.
- 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 cast steel; total annual capacity, 8,000 net tons. *See Rolling Mills.*

Star Iron Works, Bowen & Signor, Saranac, Clinton county. Three forges in Clinton county; two at Saranac, built in 1844, and one at Redford, built in 1880. One of the forges at Saranac has 7 fires and 2 hammers, and the other has 6 fires and one hammer; both operated by water-power. The forge at Redford has 4 fires and one hammer; water-power. Product of the three forges, steel billets and refined charcoal blooms for Siemens-Martin steel purposes. The works are in the hands of a receiver, and are idle and for sale. *See Rolling Mills.*

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; 4 fires and one hammer; water-power; product, charcoal blooms for boiler plate and for miscellaneous steel purposes, made from Keene ore; brand, two W's in circles. Idle in 1887. *See Keene Forge.*

William W. Wood, Wood's Falls, Clinton county. Built in 1863, and rebuilt in 1872; 10 fires, (3 of which are knobbling fires,) one run-out fire, one cupola for casting, and 2 hammers; water-power; product, charcoal blooms, made from ore and occasionally from scrap iron; annual capacity, 4,000 net tons. *See Rolling Mills.*

Number of forges in New York: 22.

NEW JERSEY.

Rockaway Direct Process Iron and Steel Company, Rockaway, Morris county. Office, 32 Warren st., New York. One Wilson deoxidizer, one steam hammer, and one scrap furnace; product, charcoal blooms for steel purposes, made from ore, and scrap bars. William A. Torrey, Manager. *See Rolling Mills.*

Number of direct-process works in New Jersey: one.

PENNSYLVANIA.

Raymond, (C. M.), West Middlesex, Mercer county. Built to produce iron direct from the ore. Idle. *See Rolling Mills.*

Number of direct-process works in Pennsylvania: one.

NORTH CAROLINA.

Roan Mountain Steel and Iron Company, Wilder's, Mitchell county. Built in 1875; 3 forge fires and one hammer; water-power; product, charcoal blooms, made from ore. W. D. Jenkins, Superintendent of works.

Rocky Point Forge, Dr. J. W. Patton, Murphy, Cherokee county. Rebuilt in 1870; 2 fires and one hammer; water-power; fuel, charcoal; product, charcoal blooms for boiler plate, made from ore.

Tom's Creek Forge, J. L. & D. W. Worth. Forge on Tom's creek, Surry

county. Built in 1862; 2 fires and one hammer; product, bar iron. Owners, J. L. Worth, Mt. Airy, and D. W. Worth, Bliss P. O. Number of forges in North Carolina: 3.

TENNESSEE.

King's Works, Shady, Johnson county. Built in 1838; 2 fires and one hammer; product, bar iron.

Little Doe Forge, William A. Morley, High Heath, Johnson county. Forge on Little Doe creek, 13 miles west of Taylorsville; 2 forge fires and 2 hammers; water-power; product, bar iron, made from ore.

McQueen's Forge, Isaac McQueen, Baker's Gap, Johnson county. Forge on Roane creek, 10 miles southeast of Taylorsville, built in 1877.

Morrison's Forge, Nat. Morrison, Head of Laurel P. O., Johnson county. Forge on Laurel creek, 7 miles from Taylorsville. Built in 1879; 3 fires and one hammer; water-power; product, bar iron for local use.

Mud Splatter Forge, M. M. Wagner's Sons, Howard's Iron Works P. O., Johnson county. Built in 1867; water-power.

Rhea's Forge, Dr. Robert C. Rhea, Shoun's X Roads, Johnson county. Built in 1880.

Roane Creek Forge, B. R. Brown, Shoun's X Roads, Johnson county. Built in 1859; 2 fires and one hammer; water-power; product, bar iron for local use, made from ore.

Sand Hill Forge, Daniel Slimp, Baker's Gap, Johnson county. Forge on Roane creek, 8 miles southeast of Taylorsville. Built in 1852; 2 fires and 2 hammers; water-power; product, bar iron from ore.

Number of forges in Tennessee: 8.

In the mountainous districts of East Tennessee the forges are usually operated by farmers who only make bar iron from ore whenever it is needed in their immediate neighborhood. Each forge usually has two fires; daily production about 250 lbs. to the fire; much depends upon the water-power which drives the blast and hammer; in exceptional cases even 700 lbs. a day are made.

MISSOURI.

Kimmswick Forge, Kimmswick, Jefferson county. Built in 1873; 12 Peckham converting furnaces and fires to make iron by Peckham's patent direct process; 3 steam hammers; product, charcoal blooms for Siemens-Martin steel; annual capacity, 4,000 net tons. Greeley & Shapleigh, Trustees, St. Louis. Idle.

Number of forges in Missouri: one.

Total number of iron-ore forges and direct-process works in the United States: 38.

BLOOMARIES.

NOTE.—Under this title are embraced all works which hammer blooms from pig or scrap iron. Many plate, sheet, and wire makers have charcoal forge fires in their mills making blooms exclusively for their own use, but such establishments are not included in this list.

CONNECTICUT.

Canton Bloomary Company, Collinsville, Hartford county. Built in 1880; 3 forge fires; water-power; product, charcoal blooms, made from scrap iron. William A. Baker, President; Oliver F. Perry, Secretary. Works idle.

Number of bloomaries in Connecticut: one.

NEW JERSEY.

Bloomington Forge, Martin J. Ryerson, Bloomington, Passaic county. Built in 1800, and rebuilt in 1841; 3 fires and one hammer; water-power; product, charcoal blooms for boiler plate and wire, made from scrap iron. Idle in 1887.

King Brothers, Drakesville, Morris county. Built about 1865; 2 fires and one hammer; product, scrap blooms; daily capacity, 5 to 6 net tons.

Paterson Bloomary, Peter Oberg & Co., Paterson, Passaic county. Built in 1878; 4 fires and one hammer; product, cold blast charcoal blooms and charcoal iron for boiler plate and wire, made from scrap iron; annual capacity, double turn, 2,500 net tons.

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, from scrap and pig iron, used for all purposes; annual capacity, double turn, 4,500 net tons. Robert F. Oram, President; Edward S. Hance, Superintendent.

Powerville Forge, B. O'Day, lessee, Lock Box G, Boonton. Works at Powerville. Built in 1845; 3 forge fires and one hammer; water-power; product, charcoal blooms for wire, plate, etc., made from scrap iron; annual capacity, single turn, 900 net tons. The works are idle and the lease is for sale. Owned by B. F. Howell, Morristown. *See Rolling Mills.*

Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built

about 1800; 3 forge fires and one hammer; water-power; product, charcoal blooms for wire, made from scrap iron; annual capacity, double turn, 1,000 net tons.

Steam Forge, Rockaway, Morris county. Built in 1878; 4 forge fires and one hammer; product, charcoal blooms for boiler plates, wire, and flange iron, made from scrap iron; annual capacity, 1,300 net tons. Owned by B. B. Oram. Idle.

Warren Forge, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1875; one 4-tuyere run-out, 3 forge fires, and one steam hammer; product, charcoal blooms for sheet iron, made from pig iron; annual capacity, 1,000 net tons. *See Rolling Mills.*

Windham Forge, George E. Righter, lessee, Parsippany, Morris county. Forge at Stockholm. Two fires and one hammer; water-power; product, charcoal blooms for plate iron, wire, or steel, made from scrap; annual capacity, 800 net tons. Idle.

Number of bloomaries in New Jersey: 9.

PENNSYLVANIA.

Carlisle Iron Works, J. C. Bucher, Boiling Springs, Cumberland county. Built in 1760, and rebuilt in 1860; 5 forge fires and one hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 2,200 net tons. *See Charcoal Furnaces.*

Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Built before 1749; 5 forge fires, one heating furnace, one refinery, and one hammer; water-power; product, charcoal and coke blooms for boiler plate and sheet iron, made from pig iron; annual capacity, 1,000 net tons.

Cove Forge, Wm. McIlvain & Sons, Reading. Works at Duncannon, Perry county. First put in operation in 1864; 5 fires, one refinery, and one hammer; blast operated by water-power, and hammer by steam-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,200 net tons. *See Eastern Pennsylvania Rolling Mills.*

Eagle Forge, Curtins & Co., Roland, Centre county. 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, 1,500 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Ellendale Forge, J. H. Lick & Co., Ellendale Forge, Dauphin county. Built in 1838, and rebuilt in 1872; 5 charcoal forge fires, one coke run-out, and one hammer; steam and water power; original manufacturers of the "Sheridan" blooms, made from Sheridan pig iron, used for plate and sheet iron; annual capacity, 1,200 net tons.

Ellwood Forge, Dr. G. N. Eckert's Heirs, Ellwood, Schuylkill county. Built in 1863; 4 fires and one run out; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,250 net tons. Not in operation since 1879.

French Creek Forge, Esther Kaufman, St. Peter's P. O., Chester county. Built in 1872; 4 fires and one hammer; water-power; product, charcoal blooms, made from pig and scrap iron. Thomas Wanner, Attorney.

Gibraltar Iron Works, Simon Seyfert & Co., Reading, Berks county. Rebuilt in 1846; one coke run-out, 4 charcoal forge fires, and 2 hammers; water-power; product, charcoal blooms for flue iron and boiler plate; annual capacity, 800 net tons. *See Eastern Pennsylvania Rolling Mills.*

Howard Iron Works, Howard Rolling Mill Company, 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 Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Juniata Forge, J. A. & E. Eichelberger, Petersburg, Huntingdon county. Five forge fires, one run-out fire, and one hammer; water-power; product, charcoal blooms; annual capacity, 800 net tons.

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, Samuel E. Light, 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. *See Central Pennsylvania Rolling Mills.*

Liberty Forge, Boyer Brothers, Lisburn, Cumberland county. Built in 1836; 3 forge fires, one run-out, and one hammer; water-power; product, charcoal and coke blooms, made from pig iron.

Lucknow Forge, John W. Reily, Harrisburg. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 8 forge fires and one steam hammer; product, blooms for boiler plate, sheet iron, wire, etc., made from pig and scrap iron; annual capacity, 3,500 net tons.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 fires and one hammer; water-power; product, charcoal blooms for boiler plate and best wire, made from pig iron. Wire used for flat and round head wood-screws and for best grade of carriage bolts. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Mont Alto Iron Works, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph in office at Mont Alto connecting with Western

Union office at Chambersburg. Built in 1866; 8 Wiestling's patent improved Lancashire hearths and a double run-out fire; one Namsyth 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 Superintendent, George B. Wiestling. *See Charcoal Furnaces.*

Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862; 7 forge fires, one run-out fire, and one hammer; water and steam power; product, charcoal and anthracite blooms for boiler plate, sheet iron, wire, etc., made from pig iron; annual capacity, 2,800 net tons.

Spring City Forge, Francis & Co., Spring City, Chester county. Built in 1884; 6 forge fires and one hammer; product, blooms, used for plate and sheet iron, made from scrap iron; daily capacity, double turn, 14 net tons.

Springton Forge, M. K. Genner, Wallace, Chester county. Built in 1790, and rebuilt in 1881; 4 forge fires, one run-out, and one hammer; water-power; product, charcoal blooms. Alfred G. Genner, Manager.

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Established in 1809, rebuilt in 1870; 8 fires, one double run-out, and one hammer; blast operated by water-power and hammer by steam-power. *See Rolling Mills.*

Number of bloomaries in Pennsylvania: 20.

MARYLAND.

Northeast Forge, McCullough Iron Company, Northeast, Cecil county. Built in 1847 and 1875; 18 fires and 2 hammers; product, charcoal blooms for sheet iron exclusively, made from pig iron; annual capacity, 6,000 net tons. *See Rolling Mills in Delaware and Maryland.*

Principio Forge, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Whitaker Station, Baltimore and Ohio Railroad. Built in 1883-4; 12 fires, one heating furnace, and one hammer; coke run-out attached; steam-power used throughout; product, charcoal blooms for sheet iron, used principally by the Whitaker Iron Company, of Wheeling, W. Va. G. P. Whitaker, President. *See Furnaces.*

Number of bloomaries in Maryland: 2.

VIRGINIA.

Eagle Forge, Crockett Depot, Wythe county. Built in July, 1882; 2 fires; product, bar iron for local use, made from pig iron.

Graham's Forge, Graham & Robinson, Graham's Forge P. O., Wythe county. Built in 1827; 2 fires and one hammer; water-power; prod-

uct, bar and other iron, made from charcoal pig iron. *See Charcoal Furnaces.*

Pine Forge, J. C. Frederick & Co., Mount Jackson, Shenandoah county.

Rebuilt in 1874; one charcoal forge fire, 2 hammers, one refinery, and 3 knobbling fires; water-power; product, charcoal blooms and bars. For sale.

Number of bloomaries in Virginia: 3.

ALABAMA.

Anniston (The) Bloomary, (incorporated,) Anniston, Calhoun county.

Built in 1887; 5 forge fires and one hammer; steam-power; product, blooms, made from pig iron; C. C. McCarthey, President; M. L. Morrison, Vice-President; J. L. Morrison, Secretary and Treasurer.

Number of bloomaries in Alabama: one.

OHIO.

Paulding Forge, Cecil, Paulding county. Built in 1867; 8 fires and one steam hammer; product, charcoal blooms for general purposes, made from pig iron; annual capacity, single turn, 1,500 net tons. Owned by Graff, Bennett & Co., Pittsburgh.

Number of bloomaries in Ohio: one.

Total number of pig and scrap bloomaries in the United States: 37.

ABANDONED FORGES AND BLOOMARIES.

VERMONT.

Fairhaven Iron Works, Fairhaven, Rutland county. Built in 1796.

Pittsfield Iron and Steel Company, Pittsfield, Rutland county. Works at Chittenden, Rutland county. Built in 1881-2.

MASSACHUSETTS.

Mount Hope Iron Works, East Bridgewater, Plymouth county. Office at Somerset, Bristol county. Built in 1840.

NEW YORK.

John Merchant's Forge, Schuyler Falls, Clinton county. Built in 1844.

Kingdom Forge, Essex and Lake Champlain Ore and Iron Company, Elizabethtown, Essex county. Built in 1825.

Lake Champlain Forge, State Prison Yard, Dannemora, Clinton county. Built in 1865. Abandoned in 1877.

- Lewis Iron Works, Stower & Esmond, Lewis, Essex county. Built in 1837, rebuilt in 1875.
- Merriam & Rouse, Westport, Essex county.
- New Russia Iron Works, H. A. Putnam, Elizabethtown, Essex county. Forge at New Russia. Rebuilt in 1879-80; dismantled.
- Paradox Iron Works, Schroon River, Essex county. Built in 1864.
- Plattsburgh Iron Works, Plattsburgh, Clinton county. Built in 1878.
- Rockville Forges, Altona, Clinton county. Two forges. Built in 1874 and 1879; one burned and one abandoned in 1887.
- Schroon River Iron Works, Schroon River, Essex county. Built in 1857; burned in 1881.
- Stone Forge, Nichols & Hull, Plattsburgh, Clinton county. Built in 1835. Idle, and will probably never run again.
- Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835; abandoned in 1883.

NEW JERSEY.

- Split Rock Forge, Morris county. Built in 1797.

PENNSYLVANIA.

- Allegheny Forge, Mrs. Elizabeth Lytle, 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.
- Cold Spring Forge, Tyrone, Blair county.
- Colemanville Works, Colemanville, Lancaster county. Built in 1828.
- Coleraine Forge, Shorb, Stewart & Co., Coleraine, Huntingdon county.
- Cove Forge, Estate of John Royer, Williamsburg, Blair county. Works on Frankstown branch, 2 miles from Williamsburg. Built in 1811.
- Franklin Forge, James Gardner, Hollidaysburg, Blair county.
- Juniata Iron Works, Samuel Hatfield, Alexandria. Built in 1837.
- 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. Built in 1824.
- Maria Forge, G. W. Smith, Sarah, Blair county.
- Martic 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. Built in 1808.
Moyer's Forge, Jacksonwald, Berks county. Built in 1836.
New Market Forge, Theodore B. Klein, Syner, Lebanon county. Rebuilt in 1860; 5 fires, one run-out, and one 5-ton hammer; steam and water power. Not in operation since 1885, and from present appearances will not be used in the future as a forge, having no railroad conveniences.
North Kiln Forge, M. B. Seyfert & Co., Shartlesville, Berks county. Built in 1830.
Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county.
Sadsbury Forge, Charles Goodman & Brother, Atglen, Chester county. Built about 1820.
Schuylkill Steam Forge, Douglassville, Berks county. Built in 1878; converted into a rolling mill in 1887.
Siemens-Anderson Steel Company, William Rea, trustee for creditors, Pittsburgh. Three Siemens rotators.
Washington Forge, Lamar, Clinton county.

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.
Gray Eagle Forge, Red Bluff, Wythe county. Built in 1862.
Henry R. Haines, Alexandria. Built a forge in 1886.
Liberty Forge, Liberty Furnace P. O., Shenandoah county. Built in 1821.
Milnes Iron Works, Shenandoah Iron Company, Milnes, Page county. Built in 1871; abandoned and torn down.
Mockasine Forge, Estillville, Scott county. Built in 1851.
Mount Vernon Iron Works, Abbott Iron Company, Baltimore, Md. Works near Weyer's Cave, Rockingham county. Built in 1848.
Penington's Forge, Jonesville, Lee county. Built in 1873.
Porter's Forge, Speedwell, Wythe county. Built in 1865.
Reed Island Forge, Allisonia, Pulaski county. Built in 1875.
Wilkinson's Forge, Lobdell Car-wheel Company, Carroll county.

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.
Hyatt's Forges, Martin Hyatt, Mount Airy, Surry county. Two forges on Bull run, Stokes county.
Madison Forge, Jonas W. Derr, Lincolnton. 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; 2 fires; will make no more blooms.

Rehoboth Forge, John Leonard & Co., Iron Station, Lincoln county.

Tomatola Forge, Tomatola Iron Company, Tomatola, Cherokee county. Office at Cincinnati. Built in 1869.

Tuscarora Forge, North Carolina Centre Iron and Manufacturing Company, Guilford county. Office at Philadelphia. Built in 1869.

GEORGIA.

Allatoona Creek Forge, Lewis T. Erwin, Allatoona, Bartow county. Built in 1878-9.

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.

Laurel Iron Works, T. G. McConnell, Abingdon, Virginia. Works at Laurel Bloomary, Johnson county. Built in 1824.

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, O. J. Potter, Shoun's X Roads, Johnson county. Forge on Roane creek, 4 miles southeast of Taylorsville. Built in 1867-8.

Rocky Ford Forge, J. W. McQueen, Shoun's X Roads, Johnson county. Built in 1875.

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, Knoxville Car-wheel Company, Knoxville. Forge at Stony Creek, Carter county.

Speedwell Forge, Harbison & Longmire, Speedwell, Claiborne county. Built in 1873-4.

Valley Forge, H. C. Smith, Elizabethton, Carter county. Forge on Doe river, 3 miles southeast of the village. Built in 1820.

Wagner's Forges, M. M. Wagner's Sons, Taylorsville, Johnson county. Two forges on Little Doe creek, 7 and 9½ miles west of Taylorsville.

Walker's Forge, George J. Walker, Pandora, Johnson county. Forge on Little Doe creek, 8 miles west of Mountain City.

MISSOURI.

Germania Iron Works, Anthony Zeiting, South St. Louis, St. Louis county. Built in 1871.

Maramec Iron Company, Maramec Iron Works, Phelps county. Built in 1828.

PLATE AND SHEET MILLS.

NOTE.—Mills making only nail plate, tack plate, or shovel plate are not included in this list. Mills put down as making iron plates or sheets, it will be understood, are rapidly changing to use steel. When the main office is not at the works its location is stated in parenthesis. 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—3.

Bay State Iron Company, 12 Pearl st., Boston. Steel plates.

Norway Steel and Iron Company, 6 Oliver st., Boston. Steel plates.

Tremont Nail Company, West Wareham, Plymouth county. Iron and steel plates.

NEW YORK—2.

Elmira Iron and Steel Rolling Mill Company, Elmira. Iron plates.

Troy Steel and Iron Company, Troy. Steel sheets.

NEW JERSEY—2.

American Sheet Iron Company, Phillipsburg. Iron sheets.

Paterson Iron Company, Paterson. Iron plates.

PENNSYLVANIA—EASTERN DISTRICT—29.

- Bethlehem Iron Company, Bethlehem. Heavy iron and steel plates.
 Brandywine Rolling Mills, Worth Brothers, Coatesville. Iron and steel plates.
 Catasauqua Manufacturing Company, Catasauqua. Iron and steel plates.
 Chester Rolling Mills, Thurlow, Delaware county. Iron and steel plates.
 Coatesville Iron Works, Coatesville. Iron and steel plates.
 Conshohocken, Pennsylvania, and Corliass Iron Works, J. Wood and Brothers Company, (223 North Second st., Philadelphia,) Conshohocken. Iron plates and sheets.
 Easton Sheet Iron Works, Reilly & Oliver, Easton. Iron sheets.
 Gibraltar Iron Works, Simon Seyfert & Co., Reading. Iron plates.
 Glasgow Iron Company, Pottstown. Iron and steel plates.
 Gray's Ferry Iron Works, Edward S. Buckley, 209 South Third st., Philadelphia. Iron plates.
 Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Steel plates.
 Keystone Iron Works Limited, Reading. Iron plates.
 Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Tacony, Philadelphia. Steel sheets and plates.
 Laurel Iron Works, operated by Coatesville Iron Works, Coatesville. Iron plates.
 Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Iron and steel plates.
 McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Iron plates.
 Parkesburg Iron Company, Parkesburg. Iron plates.
 Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Iron sheets and plates.
 Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Iron plates.
 Pine Iron Works, Joseph L. Bailey & Son, Pine Iron Works P. O., Berks county. Iron and steel plates.
 Plymouth Rolling Mill Company, Conshohocken. Iron and steel plates and sheets.
 Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown. Iron plates.
 Pottstown Iron Company, Pottstown. Iron and steel plates.
 Reading Iron Works, (259 South Fourth st., Philadelphia,) Reading. Iron plates and sheets.
 Schuylkill Iron Works, Alan Wood Company, (519 Arch st., Philadelphia,) Conshohocken. Iron and steel plates and sheets.
 Seyfert Rolling Mills, Samuel R. Seyfert, Reading. Iron plates.
 Stony Creek Iron Company Limited, Norristown. Iron plates.

Thorndale Iron Works Company, Thorndale, Chester county. Iron plates.

Valley Iron Works, C. E. Pennock & Co., Coatesville. Iron plates.

PENNSYLVANIA—CENTRAL DISTRICT—6.

Central Iron Works, Harrisburg. Iron and steel plates.

Lebanon Rolling Mills, Samuel E. Light, Lebanon, Lebanon county. Iron plates.

North Branch Steel Company, (330 Walnut st., Philadelphia,) Danville. Steel plates.

Paxton Rolling Mills, Harrisburg. Iron plates.

Pennsylvania Steel Company, (208 South Fourth st., Philadelphia,) Steelton, Dauphin county. Steel plates.

York Rolling Mill, Schall, Steacy & Denney, York. Iron plates.

PENNSYLVANIA—WESTERN DISTRICT—36.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers & Phillips, 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. Iron and steel plates.

Apollo Iron and Steel Company, (Pittsburgh,) Apollo, Armstrong county. Iron and steel sheets.

Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, (Pittsburgh,) Apollo, Armstrong county. Iron and steel sheets.

Arethusa Iron Works, George W. Johnson, New Castle. Iron plates and sheets.

Beaver Falls Iron Company, Beaver Falls, Beaver county. Iron sheets.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Steel plates and sheets.

Byers (A. M.) & Co., Pittsburgh. Iron plates and sheets.

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Iron and steel sheets.

Carnegie, Phipps & Co. Limited, Pittsburgh. Iron and steel plates.

Chartiers Iron and Steel Company Limited, Pittsburgh. Iron and steel sheets.

Clinton and Millvale Rolling Mills, Graff, Bennett & Co., Pittsburgh. Iron and steel plates and sheets.

Hussey, Howe & Co. Limited, Pittsburgh. Steel plates and sheets.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Iron and steel plates and sheets.

Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Iron plates and sheets.

Kimberly (P. L.) & Co., Sharon, Mercer county. Iron plates.

- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Iron and steel sheets.
- Linden Steel Company Limited, Pittsburgh. Steel plates and sheets.
- McKeesport Iron Works, W. D. Wood & Co. Limited, Pittsburgh. Iron sheets.
- Myers (H. M.) & Co. Limited, Beaver Falls. Steel sheets, used by the firm for shovels, etc.
- National Tube Works Company, McKeesport, Allegheny county. Iron and steel boiler plates.
- Old Fort Iron Mills, Brownsville, Fayette county. Iron sheets. Idle.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., Pittsburgh. Steel plates and sheets.
- Republic Iron Works Limited, Pittsburgh. Iron plates and sheets.
- Scottdale Iron Works, Scottdale, Westmoreland county. Iron sheets.
- Sharon Iron Company, Sharon, Mercer county. Iron plates and sheets.
- Singer, Nimick & Co. Limited, Pittsburgh. Steel plates.
- Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Iron plates and sheets.
- Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Iron and steel plates and sheets.
- Spang Steel and Iron Company Limited, Pittsburgh. Steel plates.
- Union Iron Mills, Carnegie Brothers & Co. Limited, Pittsburgh. Iron and steel plates.
- United States Iron and Tin Plate Company Limited, Demmler P. O., Allegheny county. Iron and steel plates and sheets.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Iron plates and sheets.
- Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Iron boiler plates.
- West Penn Steel Works, Jennings, Beale & Co. Limited, (Pittsburgh,) Leechburg, Armstrong county. Steel plates and sheets.

DELAWARE—7.

- Christiana Rolling Mill Company, Wilmington. Iron and steel plates.
- Delaware Iron Company, New Castle, New Castle county. Iron plates.
- Delaware Iron Works, Alan Wood Company, (519 Arch st., Philadelphia, Pa.,) Wooddale, New Castle county. Iron sheets.
- Marshallton Iron Works, John R. Bringhurst, Marshallton. Iron sheets.
- Minquas Iron Works, McCullough Iron Company, (1600 Washington avenue, Philadelphia, Pa.,) Wilmington. Iron sheets.
- Newport Rolling Mills, Marshall Iron Company, Newport. Iron and steel sheets.
- Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Iron and steel boiler plates.

MARYLAND—3.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland. Iron plates.

Locust Point Iron and Steel Works, Coates & Co., Baltimore. Iron and steel plates.

McCullough Iron Company, (1600 Washington avenue, Philadelphia, Pa.,) Northeast, Elkton, and Rowlandville, Cecil county. Iron sheets.

ALABAMA—1 COMPLETED AND 1 BUILDING.

Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Building, to roll sheet iron.

Birmingham Rolling Mill Company, Birmingham. Iron plates and sheets.

WEST VIRGINIA—1.

Crescent Iron Works, Whitaker Iron Company, Wheeling. Iron sheets.

KENTUCKY—5.

Anchor Iron and Steel Works, L. M. Dayton, (94 West Second st., Cincinnati, Ohio,) Newport, Campbell county. Iron plates and sheets.

Ewald Iron Company, (941 North Second st., St. Louis, Mo.,) Tennessee Rolling Works, Lyons county, and Louisville. Iron plates and sheets.

Licking Rolling Mill Company, Covington. Iron plates and sheets.

Mitchell, Tranter & Co., (Second and Elm sts., Cincinnati, Ohio,) Covington. Iron and steel plates and sheets.

Swift's Iron and Steel Works, Adam Wagner, Assignee, Newport. Iron and steel plates and sheets.

OHIO—20 COMPLETED AND 1 BUILDING.

Ætna Iron and Steel Company, Bridgeport, Belmont county. Iron and steel plates and sheets.

Britton Iron and Steel Company, Cleveland. Iron and steel plates and sheets.

Burgess Steel and Iron Works, Portsmouth, Scioto county. Iron and steel boiler plates.

Cleveland Rolling Mill Company, Cleveland. Iron and steel plates and sheets.

Falcon Iron and Nail Company, Niles. Iron sheets.

Globe Rolling Mill Company, 163 and 165 West Pearl st., Cincinnati. Iron plates and sheets.

Haselton Iron Works, Andrews Brothers & Co., Youngstown. Iron and steel sheets.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Iron and steel sheets.

- Iron-ton Rolling Mill, New York and Ohio Iron and Steel Company, Iron-ton. Iron plates and sheets.
- Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. Iron sheets and universal plates.
- Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown. Iron sheets.
- Maumee Rolling Mill Company, Toledo, Lucas county. Building, to roll sheet iron.
- New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Iron plates and sheets.
- Niles Rolling Mill, Coleman, Shields & Co., Niles, Trumbull county. Iron sheets.
- Otis Iron and Steel Company, Cleveland. Steel plates.
- Portsmouth Iron and Steel Works, (John Means, Trustee, Ashland, Ky.,) Portsmouth. Iron and steel plates and sheets. Idle.
- Riverside Iron and Steel Company, John S. Conner, Assignee, Cincinnati. Iron and steel plates and sheets.
- Russia Sheet-Iron Mills, Falcon Iron and Nail Company, lessee, Niles. Iron sheets.
- Standard Iron Company, Bridgeport, Belmont county. Iron and steel sheets.
- Summers Iron Works, Summers Brothers & Co., Struthers, Mahoning county. Iron sheets.
- Wellsville Plate and Sheet Iron Company, (111 Water st., Pittsburgh, Pa.,) Wellsville, Columbiana county. Iron plates and sheets.

INDIANA—1.

- Aurora Iron Company, Aurora. Light iron sheets.

ILLINOIS—2.

- Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. Steel plates and sheets.
- Union Steel Company, 302 First National Bank Building, Chicago. Plate mill not now in operation.

MISSOURI—2.

- Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Iron sheets.
- Laclede Rolling Mills, Chouteau, Harrison & Vallé Iron Company, 204 North Third st., St. Louis. Iron and steel plates and sheets.

MICHIGAN—1.

- Eureka Iron and Steel Works, Detroit. Iron plates.

UNITED STATES.

- Total number of iron and steel plate and sheet mills in the United States: 122 completed, and 2 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—6.

East Bridgewater Iron Company, Rogers & Sheldon, East Bridgewater.

Office, 240 Congress st., Boston. 27 nail machines.

Mount Hope Iron Company, Somerset. 100 nail machines.

Reed Brothers' Rolling Mill and Tack and Nail Works, D. L. & F. S.

Reed, Brockton. 60 cut nail and tack machines.

Robinson Iron Company, Plymouth. 18 nail machines.

Tremont Nail Company, West Wareham, Plymouth county. 173 nail machines.

Wareham Nail Company, South Wareham. 35 nail machines.

NEW JERSEY—3.

Boonton Iron Works, Boonton. 134 nail machines. (Only part of these works are in operation; Anthony, Patterson & Grubb, lessees.)

Cumberland Nail and Iron Company, Bridgeton. 90 nail machines.

Oxford Iron and Nail Company, Oxford. 103 nail machines.

PENNSYLVANIA—EASTERN DISTRICT—6.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. 118 nail machines.

Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown. 105 nail machines.

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. 41 nail machines.

Plymouth Rolling Mill Company, Conshohocken. 12 nail machines.

Pottstown Iron Company, Pottstown. 95 nail machines.

Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. 28 nail machines.

PENNSYLVANIA—CENTRAL DISTRICT—19.

Bellefonte Iron and Nail Company Limited, Bellefonte. 53 nail machines.

Chesapeake Nail Works, Charles L. Bailey & Co., Harrisburg. 103 nail machines.

- Crescent Nail Works, Standard Nail and Iron Company, Williamsport. Works at Standard. 18 nail machines.
- Dalmatia Nail and Iron Company, Dalmatia. 20 nail machines.
- Danville Nail Works, Danville Nail and Manufacturing Company, Danville. 92 nail machines.
- Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 64 nail machines.
- Harrisburg Nail Works, Harrisburg. Works at Fairview, Cumberland county. 83 nail machines.
- Hollidaysburg Iron and Nail Company, Hollidaysburg. 23 machines.
- Johnson (Reuben) & Co., Northumberland. 100 nail machines.
- Juniata Rolling Mill, McLanahan, Smith & Co. Limited, Hollidaysburg. 30 nail machines.
- Lewisburg Nail Works, Lewisburg. 41 nail machines.
- Lock Haven Nail Company, Lock Haven. 20 nail machines.
- Milton Nail Works, C. A. Godcharles & Co., Milton. 100 nail machines.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 53 nail machines.
- Portage Iron Company Limited, Duncansville. 37 nail machines.
- Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury. 41 nail machines.
- Towanda Nail Works, R. A. Bostley & Co., Towanda, Bradford county. 31 nail machines.
- Watsonstown Nail Works, Watsonstown. 18 nail machines.
- Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. 61 nail machines.

PENNSYLVANIA—WESTERN DISTRICT—9.

- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. 63 nail machines.
- Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. 96 nail machines.
- Atlantic Iron and Nail Works, P. L. Kimberly & Co., Sharon. 40 nail machines.
- Clinton Rolling Mill, Graff, Bennett & Co., Pittsburgh. 42 nail machines.
- Etna Iron Works Limited, New Castle, Lawrence county. 55 nail machines.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. 92 nail machines.
- Sable Iron and Nail Works, Zug & Co. Limited, Pittsburgh. 60 nail machines.
- Sharon Iron Company, Sharon. 64 nail machines.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. 50 nail machines.

VIRGINIA—2.

Old Dominion Iron and Nail Works Company, Richmond. Works on Belle Isle. 100 nail machines.
Virginia Nail and Iron Works Company, Lynchburg. 46 nail machines.

ALABAMA—2.

Brierfield Coal and Iron Company, Brierfield. 72 nail machines.
Central Iron Works, Helena, Shelby county. 10 nail machines.

WEST VIRGINIA—5.

Belmont Nail Company, Wheeling. 152 nail machines.
Benwood Iron Works, Benwood, Marshall county. Office at Wheeling. 173 nail machines.
La Belle Iron Works, Wheeling. 143 nail machines.
Riverside Iron Works, Wheeling. 224 nail machines.
Top Mill, Wheeling Iron and Nail Company, Wheeling. 130 nail machines.

KENTUCKY—1.

Norton Iron Works, Ashland. 126 nail machines.

TENNESSEE—2.

Knoxville Iron Company, Knoxville. 41 nail machines.
South Tredegar Iron Company, Chattanooga. 74 nail machines.

OHIO—13 COMPLETED AND 1 BUILDING.

Belfont Iron Works Company, Ironton. 126 nail machines.
Bellaire Nail Works, Bellaire. 125 nail machines.
Champion Steel and Iron Works, W. N. Whitely, Springfield. 2 nail machines.
Falcon Iron and Nail Company, Niles. 44 nail machines.
Jackson Steel and Nail Mill Company, Jackson. Building works to contain 60 nail machines.
Jefferson Iron Works, Steubenville. 152 nail machines.
Junction Iron Company, Mingo Junction. 126 nail machines.
Kelly Nail and Iron Company, Ironton. 119 nail machines.
Laughlin Nail Company, Martin's Ferry, Belmont county. Office at Wheeling, W. Va. 192 nail machines.
Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. 50 nail machines.
Mahoning Valley Iron Company, Youngstown. 55 nail machines.
Middleport Steel and Nail Works, King, Gilbert & Warner, Middleport, Meigs county. Office, Columbus. 102 nail machines.
Spaulding Iron Company, Brilliant, Jefferson county. 78 nail machines.
Wellston Steel and Nail Mill Company, Wellston, Jackson county. 130 nail machines.

INDIANA—4.

Cobb's Iron and Nail Company, Aurora. 50 nail machines.
East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county.
101 nail machines.
Greencastle Iron and Nail Company, Greencastle, Putnam county. 45
nail machines.
Terre Haute Iron and Nail Works, Terre Haute. 144 nail machines.

ILLINOIS—5.

Belleville Nail Company, Belleville. 76 nail machines.
Belleville Steel and Iron Nail Works, Belleville. 60 nail machines.
Calumet Iron and Steel Company, Cummings. Office, First National
Bank Building, Chicago. 132 nail machines.
Centralia Iron and Nail Works, Centralia. 52 nail machines.
Western Nail Company, Belleville. 154 nail machines.

WISCONSIN—1.

North Chicago Rolling Mill Company, Bay View. Offices at Chicago,
Ill., and Milwaukee, Wis. 100 nail machines.

NEBRASKA—1.

Union Steel Nail Company, Omaha. 32 nail machines. Idle.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo. 27 nail machines.

CALIFORNIA—1.

Pacific Iron and Nail Company, Oakland, Alameda county. Office, 9
Beale st., San Francisco. 96 nail machines.

UNITED STATES.

Total number of rolling mills containing cut-nail machines: 81 completed, and one building. Number of nail machines: 6,350.

In addition to the works enumerated above, all of which roll their own nail plate or intend soon to do so, there are a few small works in the country making nails from purchased plate, as follows:

Bush, (Lewis,) South Chicago, Illinois. Started a small nail works in 1885.

Chattanooga Nail and Tack Company, T. J. Lattner & Co., Chattanooga, Tenn. Began in 1887 to make steel nails and tacks.

Excelsior Nail and Tack Works, P. Richards & Son, Nicetown, Philadelphia, Pa. Built in 1876 to make tacks; began to make nails in 1886; have 23 machines; product, all varieties of fine nails and tacks.

Cleveland Nail Works, T. D. Graham, 106 Canal st., Cleveland, Ohio. Began in 1886 to make small fine nails and barrel nails.

OPEN-HEARTH STEEL WORKS.

NOTE.—These works are fully described in the list of rolling mills. The ton here used is the ton of 2,240 pounds. The works which make steel castings exclusively are so described; the others make plates, sheets, bars, billets, and forgings; a few works occasionally make a small quantity of rails.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. One 10-ton Siemens furnace.

MASSACHUSETTS—4.

Boston Car-wheel Company, corner First and I sts., South Boston. One 7-ton open-hearth furnace.

Norway Steel and Iron Company, 6 Oliver st., Boston. Three 10-ton Siemens furnaces.

Washburn and Moen Manufacturing Company, Worcester. One 12-ton Siemens furnace.

Worcester Steel Works, Worcester. One 12-ton Siemens furnace.

NEW YORK—1.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. One 8-ton open-hearth furnace. Product, steel castings.

NEW JERSEY—1.

Newark Steel Works, Benjamin Atha & Co., Newark. One 7-ton Siemens furnace.

PENNSYLVANIA—EASTERN DISTRICT—5 COMPLETED AND 2 BUILDING.

Bethlehem Iron Company, Bethlehem. Two 15-ton Siemens-Pernot furnaces standing in an advanced stage of construction. Building four open-hearth furnaces.

Chester Rolling Mills, Thurlow. Two 15-ton Siemens furnaces.

Midvale Steel Company, Nicetown P. O., Philadelphia. One 7-ton, one 12-ton, and one 15-ton Siemens furnace.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works near Manayunk. Two 15-ton Siemens furnaces.

Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville. Building two 15-ton Siemens furnaces.

Pottstown Iron Company, Pottstown. One 10-ton Siemens open-hearth furnace.

Standard Steel Casting Company, Thurlow, Delaware county. One 10-ton Siemens furnace. Product, steel castings.

PENNSYLVANIA—CENTRAL DISTRICT—2.

North Branch Steel Company, Danville. One 15-ton Siemens furnace.
Pennsylvania Steel Company, Steelton. Office, 208 South Fourth st., Philadelphia. Two 30-ton Siemens furnaces.

PENNSYLVANIA—WESTERN DISTRICT—20.

- Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Two 15-ton Siemens furnaces.
Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. This company prefers not to give a description of its works for publication.
Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 15-ton Siemens-Pernot furnaces, and one 12-ton Krupp washer which can be used as an open-hearth furnace by changing the bottom.
Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Two 12-ton Siemens open-hearth furnaces. Building two 20-ton Siemens open-hearth furnaces. Product, steel castings exclusively.
Fort Pitt Iron and Steel Works, Carbon Iron Company, Pittsburgh. One 3-ton open-hearth furnace.
Homestead Steel Works, Carnegie, Phipps & Co. Limited, 48 Fifth avenue, Pittsburgh. Four 35-ton Siemens furnaces.
Hussey, Howe & Co. Limited, Pittsburgh. One 35-ton Siemens open-hearth furnace.
Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 12-ton Siemens furnaces.
La Belle Steel Works, Smith Bros. & Co., Pittsburgh. Two 15-ton Siemens furnaces.
Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg. One 10-ton Siemens open-hearth furnace.
Linden Steel Company Limited, Pittsburgh. One 10-ton, one 15-ton, and one 25-ton Siemens furnace.
Millvale Rolling Mill, Graff, Bennett & Co., Pittsburgh. Two 15-ton Siemens furnaces.
National Tube Works Company, McKeesport, Allegheny county. One 18-ton Siemens furnace.
Pennsylvania Iron and Steel Works, W. J. Hammond & Sons Limited, Pittsburgh. One 15-ton Siemens furnace. Idle.
Pittsburgh Steel Works, Anderson, DuPuy & Co., Pittsburgh. One 20-ton Siemens furnace.
Sharon Steel Casting Company, Sharon, Mercer county. One 15-ton Siemens furnace. Product, steel castings.

Singer, Nimick & Co. Limited, Pittsburgh. One 10-ton Siemens open-hearth furnace.

Soho Iron Mills, Moorhead-McCleane Company, Pittsburgh. Two 15-ton Siemens furnaces.

Spang Steel and Iron Company Limited, Pittsburgh. Three 10-ton Siemens furnaces.

West Penn Steel Works, Jennings, Beale & Co. Limited, Stevenson Building, Pittsburgh. Works at Leechburg, Armstrong county. One 10-ton Siemens furnace.

ALABAMA—1 BUILDING.

Henderson Steel and Manufacturing Company, Birmingham. Building one Henderson open-hearth furnace.

KENTUCKY—1.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. One 7-ton Siemens furnace.

TENNESSEE—1.

Roane Iron Company, Chattanooga. Two 10-ton Siemens furnaces.

OHIO—9.

Bolton Steel Company, Canton. One 10-ton Siemens furnace.

Burgess Steel and Iron Works, Portsmouth. One 8-ton Siemens furnace. Building one 10-ton Siemens furnace.

Cleveland Rolling Mill Company, Cleveland. Three 7-ton and two 15-ton Siemens furnaces.

Columbus Steel Company, Columbus. Two 15-ton Siemens furnaces.

Otis Iron and Steel Company, Cleveland. Four 15-ton Siemens furnaces.

Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth, Ohio. One 10-ton Siemens furnace. Idle.

Solid Steel Company, Alliance, Stark county. One 5-ton and one 10-ton open-hearth furnace. Product, steel castings.

Youngstown Steel Company, Youngstown. One 20-ton Siemens furnace, and one 10-ton Siemens-Pernot furnace for dephosphorizing metal by the Krupp-Bell process.

Zanesville Iron Works, Ohio Iron Company, Zanesville. One 10-ton Siemens furnace.

INDIANA—2.

Ætna Iron and Steel Works, 161 La Salle st., Chicago. Works at Crown Point, Indiana. One small open-hearth furnace. Product, steel castings.

Indianapolis Rolling Mill Company, Indianapolis. Two 15-ton Siemens furnaces.

ILLINOIS—2.

Calumet Iron and Steel Company, Chicago. Four 4-ton Siemens furnaces.

Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield. Two 20-ton Siemens-Pernot furnaces.

CALIFORNIA—1.

Pacific Rolling Mill Company, 202 Market st., P. O. Box 2,032, San Francisco. One 5-ton and one 18-ton Siemens furnace.

UNITED STATES.

Total number of open-hearth steel works in the United States: 50 completed, and 3 building. Number of furnaces: 94 completed, and 10 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. 48 pots. Product used exclusively for car-wheel tires.

CONNECTICUT—3.

Collins Company, Collinsville, Hartford county. 180 pots. Product used in the manufacture of edge tools.

Farist (The) Steel Company, Bridgeport. 96 pots.

Windsor Locks Steel Company, Bridgeport. Works at Windsor Locks. 40 pots.

NEW YORK—5.

Chrome Steel Works, Kent avenue and Keap st., Brooklyn. 96 pots. Johnson (Isaac G.) & Co., Spuyten Duyvil. 20 pots. Product, steel castings.

Monhagen Steel Works, Wheeler, Madden and Clemson Manufacturing Company, Middletown. 96 pots. Product used in making saws.

Sanderson Brothers Steel Company, Syracuse. 64 pots.

Syracuse Steel Foundry Company, Syracuse. 16 pots. Adding three additional steel melting furnaces.

NEW JERSEY—5.

Heller & Brothers, Newark. 48 pots. Product used in making tools.

Jersey City Steel Company, Jersey City. 320 pots.

Newark Steel Works, Benjamin Atha & Co., Newark. 144 pots.

Pompton Steel and Iron Company, Pompton, Passaic county. 160 pots.

West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City. 96 pots.

PENNSYLVANIA—21.

Beaver Falls Steel Works, Beaver Falls, Beaver county. 24 pots.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh.

This firm prefers not to give a description of its works for publication.

Burgess, (Charles,) Titusville, Crawford county. 12 pots.

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. 180 pots.

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. 24 pots.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. 12 pots. Product, steel castings.

Fort Pitt Iron and Steel Works, Carbon Iron Company, Pittsburgh. 60 pots.

Frankford Steel Company, Frankford P. O., Philadelphia. 40 pots.

Hussey, Binns & Co. Limited, Pittsburgh. 24 pots. Product used in making shovels and scoops.

Hussey, Howe & Co. Limited, Pittsburgh. 204 pots.

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Tacony, Philadelphia. 100 pots. Product used in making saws, etc.

La Belle Steel Works, Smith Bros. & Co., Pittsburgh. 120 pots.

Midvale Steel Company, Nicetown P. O., Philadelphia. 48 pots.

Nellis's Agricultural Works, A. J. Nellis Company, Pittsburgh. 20 pots. Product used for agricultural implements.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford P. O., Philadelphia. 48 pots.

Pittsburgh Steel Casting Company, Pittsburgh. 90 pots. Steel castings.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. 66 pots.

Singer, Nimick & Co. Limited, Pittsburgh. 258 pots.

Standard Steel Casting Company, Thurlow, Delaware county. 18 pots. Product, steel castings.

Sterling Steel Company Limited, 208 Wood st., Pittsburgh. Works at Demmler. 48 pots.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. 162 pots.

MARYLAND—1.

Crown and Cumberland Steel Company, Cumberland. Office, Pittsburgh, Pa. 24 pots.

TENNESSEE—1.

Southern Steel Works, John Leighton & Sons, Chattanooga. 4 pots.

OHIO—1.

Burgess Steel and Iron Works, Portsmouth, Scioto county. 24 pots.

INDIANA—1 COMPLETED AND 1 BUILDING.

Ætna Iron and Steel Works, 161 La Salle st., Chicago. Works at Crown Point, Indiana. 4 pots. Product, steel castings.

Schulte, Nehring & Co., Evansville. Building, to contain 20 pots. Product, steel castings.

ILLINOIS—1.

Chicago Crucible Steel Casting Company, 1326 Indiana avenue, Chicago. 24 pots. Enlarging works. Product, steel castings.

MICHIGAN—1.

Detroit Steel and Spring Works, First and Larned sts., Detroit. 30 pots.

UNITED STATES.

Total number of crucible cast-steel works in the United States: 41 completed, and one building. Number of pots, 3,398.

BESSEMER STEEL WORKS.

NOTE.—The ton used in giving the capacity of the converters is the ton of 2,240 pounds. For a full description of these works see the list of rolling mills and steel works. The names of the mills which make a prominent specialty of rolling standard sections of steel rails are printed in SMALL CAPITALS.

MASSACHUSETTS—1.

WORCESTER STEEL WORKS, Worcester. Two 4-ton converters. Made first blow June 2, 1884.

NEW YORK—1.

TROY STEEL AND IRON COMPANY, Troy. Two 10-ton converters. Made first blow February 16, 1865.

PENNSYLVANIA—13 COMPLETED AND 2 BUILDING.

- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Two 7-ton converters. Made first blow August 19, 1886.
- BETHLEHEM (THE) IRON COMPANY, Bethlehem. Four 7-ton converters and one 1-ton converter. Made first blow October 4, 1873.
- Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Two small converters. Made first blow September 21, 1885.
- CAMBRIA IRON AND STEEL WORKS, CAMBRIA IRON COMPANY, Johnstown. Office, 218 South Fourth street, Philadelphia. Two 9-ton converters. Made first blow July 10, 1871.
- Columbia Iron and Steel Company, Uniontown. Office at Pittsburgh. Two 5-ton converters. Made first blow September 1, 1887.
- Duquesne Steel Company, Pittsburgh. Building a steel plant to contain two 6-ton converters.
- EDGAR THOMSON STEEL WORKS, CARNEGIE BROTHERS & Co. LIMITED, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Three 10-ton converters. Made first blow August 25, 1875.
- HOMESTEAD STEEL WORKS, CARNEGIE, PHIPPS & Co. LIMITED, Pittsburgh. Two 5-ton converters. Made first blow March 19, 1881.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. One 7-ton converter. Made first blow March 15, 1886.
- LACKAWANNA IRON AND STEEL WORKS, LACKAWANNA IRON AND COAL COMPANY, Scranton. Two 7-ton converters. Made first blow October 23, 1875.
- NORTH BRANCH STEEL COMPANY, Darville, Montour county. Building a steel plant to contain two 4-ton converters.
- PENNSYLVANIA STEEL WORKS, PENNSYLVANIA STEEL COMPANY, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Two 7-ton and three 8-ton converters. Made first blow in June, 1867.
- Pittsburgh Steel Casting Company, Pittsburgh. One 5-ton converter. Made first blow August 26, 1881.
- Pottstown Iron Company, Pottstown, Montgomery county. Two 10-ton converters. Made first blow July 1, 1886.
- SCRANTON (THE) STEEL COMPANY, Scranton. Two 6-ton converters. Made first blow March 29, 1883.

VIRGINIA—1.

- Old Dominion Iron and Nail Works Company, Richmond. Two 3-ton converters. Made first blow October 10, 1887.

WEST VIRGINIA—2.

- Riverside Iron Works, Wheeling. Two 5-ton converters. Made first blow June 11, 1884.

Wheeling Steel Works, Wheeling. Two 5-ton converters. Made first blow August 12, 1886.

TENNESSEE—2.

ROANE IRON COMPANY, Chattanooga, Hamilton county. One 5-ton converter. Made first blow May 7, 1887.

South Tredegar Iron Company, Chattanooga, Hamilton county. Main office, St. Louis, Mo. One 2-ton converter. Made first blow April 19, 1886.

OHIO—6.

Bellaire Nail Works, Bellaire, Belmont county. Two 5-ton converters. Made first blow April 28, 1884.

CLEVELAND ROLLING MILL COMPANY, Cleveland. Two 10-ton converters. Made first blow October 15, 1868.

Jefferson Iron Works, Steubenville, Jefferson county. Two 3-ton converters. Made first blow March 12, 1887.

Laughlin and Junction Steel Company, Mingo Junction, Jefferson county. Office at Wheeling, W. Va. Two 5-ton converters. Made first blow February 8, 1886.

Middleport Steel and Nail Works, King, Gilbert & Warner, Middleport, Meigs county. Office at Columbus. Two 3-ton converters.

Otis Iron and Steel Company, Cleveland. Two 5-ton converters. Made first blow August 5, 1884.

INDIANA—1.

East Chicago Steel Works, M. M. Towle, lessee, Hammond, Lake county. Two 3-ton converters. First blow made November 22, 1887.

ILLINOIS—6 COMPLETED AND 1 BUILDING.

Belleville Nail Company, Belleville, St. Clair county. Two 4-ton converters. Made first blow August 6, 1887.

Centralia Iron and Nail Works, Centralia, Marion county. Building a steel plant to contain one 2-ton converter.

JOLIET STEEL WORKS, JOLIET STEEL COMPANY, Joliet. Office, Home Insurance Building, Chicago. Two 8-ton converters. Made first blow January 26, 1873.

NORTH CHICAGO ROLLING MILL COMPANY, 17 Metropolitan Block, Chicago. Two 6-ton converters. Made first blow April 10, 1872.

NORTH CHICAGO ROLLING MILL COMPANY, South Chicago. Office, 17 Metropolitan Block, Chicago. Three 10-ton converters. Made first blow June 14, 1882.

SPRINGFIELD IRON COMPANY'S IRON AND STEEL WORKS, SPRINGFIELD IRON COMPANY, Springfield. Two 5-ton converters. Made first blow September 8, 1887.

UNION (THE) STEEL COMPANY, First National Bank Building, Chicago. Two 10-ton converters. Made first blow July 26, 1871.

MISSOURI—1.

WESTERN STEEL COMPANY, St. Louis. Two 7-ton converters. Made first blow September 1, 1876.

COLORADO—1.

COLORADO COAL AND IRON COMPANY, South Pueblo. Two 5-ton converters. Made first blow April 11, 1882.

UNITED STATES.

Total number of Bessemer steel works: 35 completed, and 3 building.
Number of converters: 74 completed, and 5 building.

CLAPP-GRIFFITHS STEEL WORKS.

MASSACHUSETTS—1.

Tremont Nail Company, West Wareham, Plymouth county. Two 3-ton converters. It was expected that the first blow would be made in November, but it did not take place in that month.

PENNSYLVANIA—6 COMPLETED AND 1 BUILDING.

Glasgow Iron Company, Pottstown, Montgomery county. Two 3-ton converters. Made first blow May 11, 1886.

Graff, Bennett & Co., Pittsburgh. Building one 3-ton converter.

Lickdale Iron Company, Lebanon. Two 3-ton converters. Made first blow September 5, 1887.

McCormick & Co., Harrisburg, Dauphin county. One 3-ton converter. Made an experimental blow April 27, 1886. Idle.

Oliver Brothers & Phillips, Pittsburgh. Two 2-ton converters. Made first blow March 25, 1884.

Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two 3-ton converters. Made first blow February 2, 1886.

Spang Steel and Iron Company Limited, Pittsburgh. Two 3-ton converters. Made first blow March 1, 1887.

ILLINOIS—1.

Western Nail Company, Belleville, St. Clair county. Two 3-ton converters. Made first blow January 21, 1886.

UNITED STATES.

Total number of Clapp-Griffiths steel works: 8 completed, and one building. Number of converters: 15 completed, and one building.

WIRE-NAIL WORKS.

NOTE.—Very few of these works draw the wire which they use, but in some cases they roll rods and draw wire also. The works which roll rods are fully described in the list of rolling mills.

MASSACHUSETTS—12.

American Tack Company, Fairhaven. Number of machines, 25.
Bradford Brothers, Brockton.
Clark & Dow, Haverhill.
Cushing, (Frank,) Brockton.
Dunbar, Hobart & Whidden, Whitman.
Field (A.) & Sons, Taunton.
Gurney, (D. B.,) Whitman.
Perkins Brothers, Bridgewater. Number of wire-nail machines, 15.
Phillips (E.) & Sons, South Hanover.
Taunton Tack Company, Taunton.
Trufant, (W. E.,) Whitman.
Wire (The) Goods Company, Worcester.

RHODE ISLAND—1.

American Screw Company, Providence. Draw wire and make wire nails.

CONNECTICUT—4.

Bryant Nail Company, New Haven. Office, State st., Boston, Mass.
Birmingham Wire Nail Company, Birmingham.
Excelsior Wire Nail Company, Seymour.
Russell and Erwin Manufacturing Company, New Britain. Office, 45 Chambers st., New York City.

NEW YORK—7.

Brooklyn Wire Nail Company, 17 Broadway, New York City. Draw wire and make wire nails.
Griswold, (J. Wool,) Troy.
Hassall, (W.,) 63 and 65 Elizabeth st., New York City.
Hoag & Titchener, Binghamton.
Metropolitan Wire Nail Company, New York City.
New York Wire Nail Company, (Kaufman Brothers,) 12 First st., New York City.
Sweet's Manufacturing Company, Syracuse. Number of machines, 26.

PENNSYLVANIA—7.

Excelsior Tack Works, P. Richards & Son, Nicetown, Philadelphia.
Number of wire-nail machines, 3.
Hartman Steel Company Limited, Beaver Falls. Roll rods, draw wire,
and make wire nails.
Meadville Wire Nail Company, Meadville.
New Castle Wire Nail Company, New Castle. Draw wire and make
wire nails. Number of wire-nail machines, 65.
Pennsylvania Tack Company, Norristown.
Philips, Townsend & Co., North Penn Junction, Philadelphia.
Pittsburgh Wire Nail Company, Pittsburgh.

KENTUCKY—1.

American Wire Nail Company, Covington.

OHIO—4.

Cincinnati Wire Company, Cincinnati. Number of wire-nail machines,
75. Will shortly add 75 more machines.
Findlay Wire Nail Company, Findlay.
H. P. Nail Company, Cleveland. Roll rods, draw wire, and make wire
nails. Number of wire-nail machines, 150.
Salem Wire Nail Company, Salem. Draw wire and make wire nails.

INDIANA—1.

United States Wire Nail Company, 84 Shelby st., Indianapolis. Num-
ber of wire-nail machines, 98. Draw wire and make wire nails.

ILLINOIS—3.

Chicago Wire Nail Company, Chicago.
Illinois Wire Nail Company, Chicago.
Lenz Wire Nail Company, Belleville. Number of wire-nail machines,
11. Will soon add more machines.

MISSOURI—2.

Freeman Wire Company, St. Louis.
Southern Wire Company, St. Louis.

IOWA—1.

McCosh Iron and Steel Company, Burlington. Draw wire and make
wire nails.

MICHIGAN—1.

Standard Nail Company, Detroit.

MINNESOTA—1.

Northwestern Nail and Manufacturing Company, Minneapolis.

NEBRASKA—1.

Omaha Barb Wire Company, Omaha.

CALIFORNIA—1.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Number of wire-nail machines, 4.

UNITED STATES.

Total number of wire-nail works in the United States: 47.

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.

MAINE—1.

Eastern Wire Works, Harrison.

MASSACHUSETTS—10.

Cambridge Rolling Mills, Gilmore & Eustis, Cambridgeport. Rods.

George C. Prouty, Charlton City.

Lamb (Horace) & Co., Northampton.

Leicester Wire Company, Leicester.

Norway Steel and Iron Company, Boston. Rods.

Palmer Wire Manufacturing Company, Palmer.

Prentiss (G. W.) & Co., Holyoke.

Spencer Wire Company, Spencer.

Washburn and Moen Manufacturing Company, Worcester. Rods and wire.

Worcester Wire Company, Worcester.

RHODE ISLAND—1.

American Screw Company, Providence.

CONNECTICUT—4.

Ansonia Brass and Copper Company, Ansonia.

Gilbert and Bennett Manufacturing Company, Georgetown.

New Haven Rolling Mill Company, New Haven. Rods.

New Haven Wire Company, New Haven.

NEW YORK—8.

Brooklyn Wire Nail Company, 17 Broadway, New York City.
Carey & Moen, 234 West 29th st., New York City.
Griswold, (J. Wool,) Troy.
Syracuse Iron Works, Syracuse. Rods.
Troy Steel and Iron Company, Troy. Rods.
Westerman Rolling Mill, Westerman & Co., Lockport. Rods.
Wickwire Brothers, Cortland.
Wolff (R. H.) & Co. Limited, 117th and 118th sts. and Harlem River,
New York City.

NEW JERSEY—3.

John A. Roebling's Sons Company, Trenton. Rods and wire.
New Jersey Steel and Iron Company, Trenton. Rods.
Trenton Iron Company, Trenton. Rods and wire.

PENNSYLVANIA—13.

Braddock Wire Company, Pittsburgh. Rods and wire.
Cambria Iron Company, Johnstown. Rods.
Gautier Steel Department of Cambria Iron Company, Johnstown.
Rods and wire.
Hartman Steel Company Limited, Beaver Falls, Beaver county. Rods
and wire.
Hazard Manufacturing Company, Wilkesbarre.
Howard Iron Works, Howard Rolling Mill Company, Howard, Centre
county. Rods.
Iowa Barb Wire Company, Allentown. Office, 98 Reade st., New York.
Lehigh and Franklin Wire Mills, Stewart & Co., Easton.
Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Rods
and wire.
New Castle Wire Nail Company, New Castle, Lawrence county. Draw
steel wire for nails.
Oliver and Roberts Wire Company Limited, Pittsburgh. Rods and
wire.
Philadelphia Wire Works, Thomas Hamilton, 1340 Vienna st., Phila-
delphia.
Williamsport Iron and Nail Works, Milton Iron Company, Williams-
port. Rods.

MARYLAND—1.

Canton Wire Works, Canton.

OHIO—7.

American Wire Company, Cleveland. Rods and wire.
Belmer (H.) & Co., Cincinnati.
Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Rods
and wire.

Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus. Rods.

Globe Rolling Mill Company, Cincinnati, Hamilton county. Rods and wire.

H. P. Nail Company, Cleveland. Rods and wire.

Salem Wire Nail Company, Salem.

INDIANA—1.

United States Wire Nail Company, 84 Shelby st., Indianapolis.

ILLINOIS—6.

Ashley Wire Company, Joliet.

Grant Wire and Spring Company, Lockport.

Illinois Wire Company, East St. Louis.

Kraft, Gross & Co., Joliet.

Lambert and Bishop Wire Fence Company, Joliet.

Union (The) Steel Company, Chicago. Rod and wire mills unused.

MISSOURI—1.

St. Louis Wire Mill Company, St. Louis.

CALIFORNIA—1.

California Wire Works, 329 Market st., P. O. Box 2,050, San Francisco.

UNITED STATES.

Total number of wire-rod and wire mills in the United States: 57.

BRASS AND COPPER WIRE—12.

NOTE.—Some of the works in the preceding list make copper and brass wire as well as iron and steel wire. The following establishments make brass and copper wire, but not iron or steel wire.

Bridgeport Brass Company, Bridgeport, Conn.

Brooklyn Brass and Copper Company, Brooklyn, N. Y.

Detroit Copper and Brass Rolling Mills, Detroit, Mich.

DeWitt Wire Cloth Company, Belleville, New Jersey.

Hendricks Brothers, Belleville, N. J. New York office, 49 Cliff st.

Holmes, Booth & Haydens, Waterbury, Conn.

Lockwood, (D. & J.), Cannon's Station, Conn.

Manhattan Brass Company, 469 First avenue, New York.

Plume and Atwood Manufacturing Company, Thomaston, Conn.

Rome Iron Works, Rome, N. Y.

Stanier & Laffey, East Newark, N. J.

Waterbury Brass Company, Waterbury, Conn.

CAR-WHEEL WORKS.

The following list does not include railroad companies which make car wheels.

MAINE—2.

McCullough & Tait, Calais. Product, chilled cast iron wheels.
Portland Company, Portland. Product, cast iron wheels. Annual capacity, 7,500.

NEW HAMPSHIRE—3.

Ford & Kimball, Concord. Product, cast iron wheels.
Laconia Car Company, Laconia. Product, cast iron wheels.
Nashua Iron and Steel Company, Nashua. Product, hardened steel-tired wheels.

VERMONT—3.

Miltimore Elastic Steel Car Wheel Company, Arlington. Product, steel wheels. Daily capacity, 25.
Rutland Foundry and Machine Shop Company, Rutland. Product, cast iron wheels. Annual capacity, 5,000.
St. Albans Foundry, St. Albans. Product, cast iron wheels.

MASSACHUSETTS—5.

Boston Standard Wheel Company, Boston. Product, cast iron wheels.
Heartt (Jonas S.) & Co., Troy, N. Y. Works at Allston, Mass. Product, cast iron wheels.
Mason Machine Works, Taunton. Product, cast iron wheels.
Wason Manufacturing Company, Springfield. Product, cast iron wheels. Annual capacity, 20,000.
Worcester Steel Works, Worcester. Product, cast iron tram-car wheels. Annual capacity, 25,000.

CONNECTICUT—2.

Barnum Richardson Company, Wm. H. Barnum, President, Lime Rock. Product, chilled iron wheels. Annual capacity, 25,000.
Washburn Car Wheel Company, Hartford. Product, crucible-steel-tired wheels. Annual capacity, 5,000.

NEW YORK—14.

Albany Car Wheel Works, Albany. Product, cast iron wheels.
Allen Paper Car Wheel Company, Hudson. Product, steel-tired wheels, paper centres. Annual capacity, 12,000.

- Andrews, (Frank H.) 535 West 33d st., New York City. Product, cast iron wheels.
- Atwood Hemp Car Wheel Company, New York City.
- Brooks Locomotive Works, Dunkirk, Chautauqua county. Product, Thurber steel wheels.
- Buffalo Car Wheel Works, Buffalo. Product, cast iron wheels.
- Heartt (Jonas S.) & Co., Troy. Product, cast iron wheels.
- Kingsford, (Thomas,) Oswego. Product, cast iron wheels.
- New York Car Wheel Works, Buffalo. Product, cast iron wheels. Annual capacity, 70,000.
- Peckham Car Wheel Company, Syracuse. Product, steel-tired paper car wheels.
- Ramapo Wheel and Foundry Company, Ramapo. Product, cast chilled iron wheels and steel-tired wheels. Annual capacity, 60,000 cast iron and 6,000 steel-tired.
- Rochester Car Wheel Company, Rochester. Product, cast iron wheels. Annual capacity, 70,000.
- Rood and Brown, East Buffalo. Product, cast iron wheels. Annual capacity, 50,000.
- Thacher (Geo. H.) & Co., Albany. Product, cast iron wheels.

NEW JERSEY—5.

- Jersey City Wheel Foundry and Machine Works, Jersey City. Product, cast iron wheels and Thomas steel-tired wheels.
- Taylor Iron Works, High Bridge. Product, chilled iron wheels and steel-tired wheels. Annual capacity, 41,000.
- Thompson, (L. P.) Bordentown. Product, cast iron wheels.
- Washburn Cast Steel Car Wheel Company, Raritan. Product, cast steel wheels.
- Washburn (The) Hunts Company, Jersey City. Product, cast iron wheels. Annual capacity, 25,000.

PENNSYLVANIA—18.

- Boies Steel Car Wheel Works, H. M. Boies, Scranton. Product, steel wheels. Annual capacity, 7,500.
- Cayuta Wheel and Foundry Company, Sayre. Product, cast iron wheels. Annual capacity, 100,000.
- Chester Steel Castings Company, 407 Library st., Philadelphia. Product, cast steel wheels.
- Connellsville Machine and Car Works, Connellsville. Product, cast iron pit-car wheels. Annual capacity, 20,000.
- Davenport & Fairbairn, Erie. Product, cast iron wheels. Annual capacity, 105,000.
- Freas Manufacturing Company, Berwick.
- Harman & Hassert, Bloomsburg. Product, cast iron wheels.

- Harrisburg Car Manufacturing Company, Harrisburg. Product, cast iron wheels. Annual capacity, 36,000.
- Hazleton Iron Works, Allison, John & Co., Hazleton. Product, cast iron wheels. Daily capacity, 50.
- Hodge Manufacturing Company Limited, Greenville. Product, cast iron wheels.
- Huntingdon Car and Car Wheel Works, Huntingdon. Product, cast iron wheels.
- Jackson and Woodin Manufacturing Company, Berwick. Product, cast iron wheels. Annual capacity, 70,000.
- Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Product, cast iron wheels. Daily capacity, 300.
- Marshall, (John,) Kittanning. Product, cast iron wheels.
- McCaskey Car Wheel Company, New Castle. Product, cast iron wheels.
- Redstone Foundry, Uniontown. Product, cast iron wheels.
- Sax, (J. K.,) Pittston. Product, cast iron wheels.
- Whitney (A.) & Sons, Callowhill and Sixteenth sts., Philadelphia. Product, steel-tired and chilled cast iron wheels. Daily capacity, 80 tons.

DELAWARE—1.

- Lobdell Car Wheel Company, Wilmington. Product, chilled iron wheels. Daily capacity, 500.

MARYLAND—1.

- Baltimore Car Wheel Company, Fulton Junction, Baltimore. Product, steel-tired and chilled iron wheels. Daily capacity, 400.

VIRGINIA—2.

- Atlantic Iron Works, W. A. Anderson, Norfolk. Product, cast iron wheels. Annual capacity, 200 to 300.
- Tredegear Company, Richmond. Product, cast iron wheels.

ALABAMA—3.

- Decatur Car Wheel and Manufacturing Company, Decatur. Product, cast iron wheels. Daily capacity, 120.
- Noble Brothers & Co., Anniston. Product, cast iron wheels. Annual capacity, 60,000.
- Peacock, (George,) Selma. Product, cast iron wheels.

TEXAS—1.

- Marshall Car Wheel and Foundry Company, Marshall. Product, cast iron wheels. Annual capacity, 50,000.

WEST VIRGINIA—1.

- Ensign (The) Manufacturing Company, Huntington. Product, cast iron chilled wheels. Annual capacity, 78,000.

KENTUCKY—1.

Louisville Car Wheel and Railway Supply Company, Louisville. Product, cast iron wheels.

TENNESSEE—3.

Chattanooga Car and Foundry Company, Chattanooga.

Knoxville Car Wheel Company, Knoxville. Product, cast iron wheels.

Wason Car and Foundry Company, Chattanooga. Product, cast iron wheels.

OHIO—12.

Barney and Smith Manufacturing Company, Dayton. Product, cast iron wheels. Annual capacity, 45,000.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Product, self-oiling chilled mine-car wheels. Annual capacity, 15,000.

Cleveland Foundry, Bowler & Co., Cleveland. Product, chilled and steel-tired wheels. Annual capacity, 100,000.

Cleveland Wheel and Foundry Works, Maher & Brayton, Cleveland. Product, cast iron wheels.

Fulton Foundry Company, Cleveland. Product, chilled iron wheels.

Gill Car Manufacturing Company, Columbus, Franklin county. Product, cast iron wheels.

Lafayette Car Works, Lima. Main office, Lafayette, Ind. Annual capacity, 25,000.

Lima Machine Works, Lima. Product, cast iron and steel-tired wheels. Annual capacity, 1,500 tons.

Mowry Car Wheel Works, Cincinnati. Product, cast iron wheels.

Nelsonville Foundry and Machine Company, Nelsonville. Product, cast iron wheels.

Paige Car Wheel Company, 211 Superior st., Cleveland. Product, steel-tired plate and spoke wheels. Annual capacity, 10,000.

Watt (The) Mining Car Wheel Company, Barnesville. Product, self-oiling chilled mine-car wheels. Annual capacity, 35,000.

INDIANA—7.

Bass Foundry and Machine Works, Fort Wayne. Product, cast iron wheels.

Haskell and Barker Car Company, Michigan City. Product, cast iron wheels.

Indianapolis Car and Manufacturing Company, Indianapolis. Product, cast iron wheels.

Lafayette Car Wheel Works, Lafayette. Product, cast iron wheels.

Ohio Falls Car Company, Jeffersonville. Product, cast iron wheels.

Steadman & Co., Aurora. Product, cast iron wheels.

Terre Haute Car and Manufacturing Company, Terre Haute. Product, cast iron wheels. Annual capacity, 35,000.

ILLINOIS—11.

Allen Paper Car Wheel Company, Pullman, Cook county, and Morris, Grundy county. Two works. Product, paper wheels. Total annual capacity, 24,000.

Barnum Richardson Manufacturing Company, Chicago. Product, cast iron wheels.

Bass, (J. H.,) Chicago. Product, cast iron wheels.

Bouton & Co., Chicago. Works at Aurora. Product, cast iron wheels. Annual capacity, 36,000.

Chicago Car Wheel Company, Chicago. Product, cast chilled iron and steel-tired wheels. Annual capacity, 40,000.

Fowler Steel Car Wheel Company, 185 Dearborn st., Chicago. Product, rolled steel car wheels. Annual capacity, 75,000.

Griffin Wheel and Foundry Company, Chicago. Product, cast iron wheels. Annual capacity, 100,000.

Litchfield Car and Machine Company, Litchfield. Product, cast iron wheels. Annual capacity, 37,000.

Munton Steel Car Wheel Company, Chicago.

Union Foundry and Pullman Car Wheel Works, 212 Pullman Building, Chicago. Product, cast iron wheels. Annual capacity, 100,000.

MISSOURI—7.

Green's Car Wheel Manufacturing Company, St. Louis. Product, cast iron wheels.

Kansas City Car and Wheel Company, Kansas City.

Missouri Car and Foundry Company, St. Louis. Product, cast iron wheels. Annual capacity, 100,000.

Moore & Moss, Kansas City. Product, cast iron wheels.

St. Charles Car Company, St. Charles. Product, cast iron wheels. Annual capacity, 36,000.

St. Louis Car Wheel Company, St. Louis. Product, cast iron wheels.

Treat (C. A.) Manufacturing Company, Hannibal. Product, cast iron wheels. Annual capacity, 25,000.

MICHIGAN—5.

Butterworth & Lowe, Grand Rapids. Product, cast iron wheels. Annual capacity, 9,000.

Detroit Car Wheel Works, Detroit. Product, cast iron wheels.

Griffin Car Wheel Company, Detroit. Product, chilled charcoal iron wheels. Annual capacity, 75,000.

Peninsular Car Company, Detroit. Product, cast iron wheels. Annual capacity, 80,000.

Russell Wheel and Foundry Company, Detroit. Product, cast iron wheels.

WISCONSIN—2.

Doty Manufacturing Company, Janesville. Product, cast iron wheels.
May, Swallow & Co., Milwaukee. Product, cast iron wheels.

MINNESOTA—2.

Menzel & Ferguson, Northwestern Foundry, Minneapolis. Product, cast iron wheels. Annual capacity, 6,000.
St. Paul Foundry Company, St. Paul. Product, cast iron wheels. Annual capacity, 10,000.

CALIFORNIA—2.

Risdon Iron and Locomotive Works, San Francisco. Product, cast iron wheels.
Steiger & Kerr, 137 First st., San Francisco. Product, cast iron wheels.

WASHINGTON TERRITORY—1.

Tacoma Car Wheel Works, Tacoma.

UNITED STATES.

Total number of car-wheel works in the United States: 114.

CAR-AXLE WORKS.

MAINE—1.

Eastern Forge Company, Portland, Cumberland county.

NEW HAMPSHIRE—2.

Cole Manufacturing Company, Lake Village.
Nashua Iron and Steel Company, Nashua, Hillsborough county.

MASSACHUSETTS—4.

Boston Forge Company, Boston.
Bridgewater Iron Company, Bridgewater.
Cape Ann Anchor Works, Gloucester.
Talcott (N. W.) Axle Works, Brightwood.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence.

CONNECTICUT—1.

Bridgeport Forge Company, Bridgeport.

NEW YORK—6.

DeLaney Forge and Iron Company, Buffalo.
Gould's (C. A.) Buffalo Steam Forge, 24 Hayen Building, Buffalo.
Peckham Car Wheel Company, Syracuse.
Sizer, (W. S.), Steam Forge, Buffalo.
Troy Steel and Iron Company, Troy.
Wood, (William W.), Wood's Falls.

NEW JERSEY—3.

Macpherson, Willard & Co., Bordentown.
Paterson Iron Company, Paterson.
Taylor Iron Works, High Bridge. Annual capacity, 30,000 axles.

PENNSYLVANIA—25 COMPLETED AND 1 BUILDING.

Allentown (The) Rolling Mills, Allentown.
Anchor Brand Axle Works, Sheldon Axle Company, Wilkesbarre.
Building.
Bethlehem (The) Iron Company, Bethlehem.
Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia.
Carnegie, Phipps & Co. Limited, Pittsburgh.
Catasauqua Manufacturing Company, Catasauqua.
Cayuta Forge and Axle Company, Sayre.
Dickson Manufacturing Company, Scranton.
Erie Forge Company Limited, Erie.
Frankford Steel Company, Frankford, Philadelphia.
Green Ridge Iron Works, A. L. Spencer, Scranton.
Jackson and Woodin Manufacturing Company, Berwick.
Lackawanna Iron and Coal Company, Scranton.
Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua.
Lewisburg Steam Forge Company, Lewisburg.
Midvale Steel Company, Nicetown, Philadelphia.
Milton Iron Company, Milton.
Montour Iron and Steel Company, Danville.
Old Fort Iron Mills, Brownsville. Idle.
Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia.
Penn Iron Company Limited, Lancaster.
Pennsylvania Steel Company, Steelton. Office, 208 South Fourth st., Philadelphia.
Pittsburgh Forge and Iron Company, Pittsburgh.
Standard Steel Works, Lewistown.
Vulcan Forge and Iron Works, Long & Co., Pittsburgh.
Ward (The) Axle, Brake, and Coupling Manufacturing Company, Monongahela City. Office, 87 Diamond st., Pittsburgh.

DELAWARE—1.

Johnson Forge Company, Wilmington.

MARYLAND—1.

Baltimore and Ohio Railroad Company, Cumberland.

VIRGINIA—3.

Johnson (J. R.) & Co., Richmond.

Old Dominion Iron and Nail Works Company, Richmond.

Tredegear Iron Works, Tredegear Company, Richmond.

ALABAMA—1.

Anniston Rolling Mill, Noble Brothers & Co., Anniston. Daily capacity, single turn, 40.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington.

KENTUCKY—2.

Louisville Steam Forge Company, Louisville.

Swift's Iron and Steel Works, Newport. Office, Cincinnati.

OHIO—5.

Akron Steam Forge Company, Akron.

Cincinnati Forge and Iron Company, Cincinnati.

Cleveland City Forge and Iron Company, Cleveland.

Lake Erie Iron Company, Cleveland.

Otis Iron and Steel Company, Cleveland.

INDIANA—3.

Bass Foundry and Machine Works, Fort Wayne.

Central Iron and Steel Company, Brazil.

New Albany Steam Forge, New Albany. Annual capacity, 40,000.

ILLINOIS—3.

Chicago Forge and Bolt Company, Chicago.

Pullman's Palace Car Company, Pullman.

Willard Sons & Bell Company, Chicago.

MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis.

St. Louis Steam Forge and Iron Works, A. McDonald & Bro., St. Louis.

MICHIGAN—1.

Baugh Steam Forge Company, Detroit.

WISCONSIN—1.

De Pere Steam Forge, West De Pere.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo.

UTAH TERRITORY—1.

Silver Iron Works, Wm. J. Silver, Salt Lake City.

CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco.

UNITED STATES.

Total number of car-axle works in the United States: 70 completed, and one building.

CARBUILDERS.

NOTE.—Those companies or firms which make street cars only are so mentioned; those which make both railroad cars and street cars are indicated by the word "both" after their addresses; all others make railroad cars only.

MAINE—3.

Crangle, (E. J.,) Calais.

Lombard, (Thomas,) Augusta.

Portland Company, Portland. Annual capacity, 500.

NEW HAMPSHIRE—1.

Laconia Car Company, Laconia.

MASSACHUSETTS—4.

Bradley Car Works, Worcester.

Keith Manufacturing Company, Hyannis.

Keith Manufacturing Company, Sagamore.

Wason Manufacturing Company, Springfield.

NEW YORK—8.

Buffalo Car Manufacturing Company, Buffalo.

Feigel Car Company, New Utrecht, Long Island. Both.

Gilbert Car Manufacturing Company, Troy and Schenectady.

Jones's (J. M.) Sons, West Troy. Street cars only.

Pioneer Iron Works, Brooklyn.

Stephenson (The John) Company Limited, New York City. Street cars only. Annual capacity, 600.

Turle Iron Works, New York City.

Wagner Palace Car Company, Buffalo.

PENNSYLVANIA—27.

Allison Manufacturing Company, Philadelphia.
Altoona Car Works, Altoona.
Billmeyer and Small Company, York.
Bloomsburg Car Works, Bloomsburg. Annual capacity, 2,000.
Carlisle Manufacturing Company, Carlisle.
Connellsville Machine and Car Works, Connellsville.
Conshohocken Car Works, Conshohocken.
Dauphin Car Works, Dauphin. Annual capacity, 2,500 gondolas.
Empire Car Works, Schall & King, York. Annual capacity, 1,500.
Erie Car Works Limited, Erie.
Glen Rock Manufacturing Company, Glen Rock.
Harrisburg Car Manufacturing Company, Harrisburg.
Hazleton Iron Works, Allison, John & Co., Hazleton.
Huntingdon Car and Car Wheel Works, Huntingdon.
Jackson and Woodin Manufacturing Company, Berwick.
J. G. Brill Company, Philadelphia. Both. Annual capacity, 525.
Johnston (Adam) & Son, Reading.
Keene, (W. H.) Woodville.
Lebanon Manufacturing Company, Lebanon. Annual capacity, 2,000 freight cars.
Lehigh Car Manufacturing Company, Stemton.
Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Daily capacity, 20.
Middletown Car Works, Schall & King, Middletown. Annual capacity, 2,500.
Milton Car Works, Murray, Dougal & Co. Limited, Milton. Daily capacity, 12.
Morris (W.) & Brother, Hazleton.
Pardee Car Works Limited, Watsontown.
Philadelphia and Reading Coal and Iron Company, Pottsville.
Steele (J. D.) and Son Manufacturing Company, Pottstown.

DELAWARE—3.

Harlan (The) and Hollingsworth Company, Wilmington.
Jackson and Sharp Company, Wilmington. Annual capacity, 400 passenger, sleeping, and parlor cars.
Pullman's Palace Car Company, Wilmington.

VIRGINIA—2.

Roanoke Machine Works, Roanoke.
Tredegar Company, Richmond.

NORTH CAROLINA—1.

North Carolina Car Company, Raleigh.

GEORGIA—1.

Atlanta Machine Works, Atlanta.

ALABAMA—1 COMPLETED AND 1 BUILDING.

Alabama (The) Car Works, Anniston. Annual capacity, 2,400 box cars.
Elliott (The) Car Company, Gadsden. Building.

LOUISIANA—1.

L'Hote & Co., New Orleans.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington.

TENNESSEE—2.

Chattanooga Car and Foundry Company, Chattanooga.
Southern Car Works, Knoxville.

OHIO—8.

Barney and Smith Manufacturing Company, Dayton.
Kuhlmann Car Company, Cleveland. Street cars only.
Lima Car Works, Lafayette Car Works, Lima. Main office, Lafayette,
Ind. Annual capacity, 3,600.
O'Ferrell (John) & Co., Piqua.
Pennock Brothers, Minerva. Annual capacity, 2,000.
United States Rolling Stock Company, Urbana.
Watt (J. H.) & Brothers, Barnesville.
Youngstown Car Manufacturing Company, Youngstown.

INDIANA—6.

Haskell and Barker Car Company, Michigan City.
Indianapolis Car and Manufacturing Company, Indianapolis.
Lafayette Car Works, Lafayette. Annual capacity, 4,500.
Missouri Car and Foundry Company, Cambridge City. Annual capacity, 2,400.
Ohio Falls Car Company, Jeffersonville.
Terre Haute Car and Manufacturing Company, Terre Haute. Both.
Annual capacity, 4,000.

ILLINOIS—5.

Corey Car and Manufacturing Company, 14 Metropolitan Block, Chicago. Both.
Litchfield Car and Machine Company, Litchfield. Annual capacity, 4,500.
Pullman's Palace Car Company, Pullman. Both.
United States Rolling Stock Company, Hegewisch.
Wells, French & Co., Chicago.

MISSOURI—6.

Brownell and Wight Car Company, St. Louis. Street cars only. Annual capacity, 600.

Kansas City Car and Wheel Company, Kansas City.

Laclede Car Company, St. Louis. Both.

Missouri Car and Foundry Company, St. Louis. Annual capacity, 6,000.

St. Charles Car Company, St. Charles.

St. Louis Car Company, St. Louis. Street cars only.

IOWA—1.

Robinson & Hitt, Waterloo.

KANSAS—1.

Burton Stock Car Company, Wichita. Office, 194 Washington st., Boston, Mass. Daily capacity, 16.

MICHIGAN—6.

Iron Bay Foundry, Marquette.

Michigan Car Company, Detroit. Freight cars only.

Muskegon Car Company, Muskegon.

Peninsular Car Company, Detroit. Annual capacity, 9,000.

Pullman Palace Car Company, Detroit. Both.

Wallen, (H. D.,) Jr., Grand Rapids.

MINNESOTA—1.

North Western Manufacturing and Car Company, Stillwater. Not building cars at present.

CALIFORNIA—3.

Carter Brothers, San Francisco.

Hammond, (John,) San Francisco.

Soule, (E.,) San Francisco.

UNITED STATES.

Total number of carbuilders in the United States: 92 completed, and one building.

LOCOMOTIVE WORKS.

MAINE—1.

Portland Locomotive Works, Portland. Annual capacity, 72 locomotives.

NEW HAMPSHIRE—1.

Manchester Locomotive Works, Manchester. Annual capacity, 144.

MASSACHUSETTS—3.

Hinckley Locomotive Works, Boston. Annual capacity, 144.

Mason (The) Machine Works, Taunton. Annual capacity, 72.

Taunton Locomotive Manufacturing Company, Taunton. Annual capacity, 96.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence. Annual capacity, 240.

NEW YORK—3.

Brooks Locomotive Works, Dunkirk. Annual capacity, 200.

New York Locomotive Works, Rome. Annual capacity, 125.

Schenectady Locomotive Works, Schenectady. Annual capacity, 300.

NEW JERSEY—3.

Cooke Locomotive and Machine Company, Paterson. Annual capacity, 180.

Grant Locomotive Works, Paterson. Annual capacity, 180.

Rogers Locomotive and Machine Works, Paterson. Annual capacity, 300.

PENNSYLVANIA—6.

Baldwin Locomotive Works, Burnham, Parry, Williams & Co., Philadelphia. Annual capacity, 600.

Dickson Manufacturing Company, Scranton. Annual capacity, 100.

Hazleton Iron Works, Allison, John & Co., Hazleton. Light and mine locomotives.

Pittsburgh Locomotive and Car Works, Pittsburgh. Annual capacity, 130.

Porter (H. K.) & Co., Pittsburgh. Light locomotives. Annual capacity, 120.

Vulcan Iron Works, Wilkesbarre. Light locomotives.

MARYLAND—1.

Mt. Savage Locomotive Works, Mt. Savage. Annual capacity, 50.

VIRGINIA—3.

Richmond (The) Locomotive and Machine Works, Richmond. Light locomotives. Annual capacity, 100. Preparing to manufacture standard locomotives.

Roanoke Machine Works, Roanoke.

Virginia Iron Works, Godwin (T. W.) & Co., Norfolk. Light locomotives.

OHIO—2.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Light locomotives.

Lima Machine Works, Lima. Light weight and Shay patent locomotives. Annual capacity, 72.

CALIFORNIA—1.

Risdon Iron and Locomotive Works, San Francisco.

UNITED STATES.

Total number of locomotive works in the United States: 25.

WROUGHT-IRON PIPE WORKS.

MASSACHUSETTS—1.

Tyler Tube Mill, Boston.

NEW YORK—2.

Curtis & Co., Cohoes.

Syracuse Tube Company, Syracuse.

NEW JERSEY—2.

Camden Tool and Tube Works, Camden. Owned by the Reading Iron Works, 259 South Fourth st., Philadelphia, Pa.

Cumberland Nail and Iron Company, Bridgeton. Getze & Reeves, agents, 11 and 13 North Fifth st., Philadelphia, Pa.

PENNSYLVANIA—17.

Allison Manufacturing Company, Philadelphia.

American Tube and Iron Co., Middletown. Office, 98 John st., N. Y.

Byers (A. M.) & Co., Pittsburgh.

Chester Pipe and Tube Company, Chester. Office, 261 South Fourth st., Philadelphia.

Conshohocken Tube Company, Conshohocken.

Continental Tube Company, Pittsburgh.

Duquesne Tube Works Company, 99 Water st., Pittsburgh.

Friend (J. W.) & Co., Pittsburgh.

Hooven (James) & Son, Norristown.

Lehigh Tube and Coil Works, Albright's Son & Co., Allentown.

Morris, Tasker & Co. Limited, 222 South Third st., Philadelphia.

National Tube Works Company, McKeesport.

Oil City Tube Company, Oil City.

Pennsylvania Tube Works, Pittsburgh.

Pittsburgh Tube Company, Pittsburgh.

Reading Iron Works, Reading. Office, 259 South Fourth st., Phila.

Spang, Chalfant & Co., Pittsburgh.

DELAWARE—1.

Delaware Iron Company, New Castle. Office, 222 South Third st., Philadelphia, Pa.

WEST VIRGINIA—1.

Riverside Iron Works, Wheeling.

OHIO—2.

American Tube and Iron Co., Youngstown. Office, 98 John st., N. Y.
Warren Tube Company, Warren.

ILLINOIS—3.

Crane Brothers Manufacturing Company, 10 North Jefferson st., Chicago.
Fieldhouse and Dutcher Manufacturing Co., 30 W. Monroe st., Chicago.
Haxtun Steam Heater Company, Kewanee.

UNITED STATES.

Total number of wrought-iron pipe works in the United States: 29.

CAST-IRON PIPE WORKS.

NEW JERSEY—6.

Gloucester Iron Works, Gloucester City. Office, 6 North Seventh st., Philadelphia.

McNeal Iron and Pipe Company, Burlington.

Warren Foundry and Machine Company, Phillipsburg. Sales office, 160 Broadway, New York.

Wood (R. D.) & Co., Millville, Camden, and Florence. Three works.
Office, 400 Chestnut st., Philadelphia, Pa.

NEW YORK—1.

Buffalo Cast Iron Pipe Company, 344 Exchange st., Buffalo.

PENNSYLVANIA—9.

Carbon Iron and Pipe Company Limited, Mauch Chunk.

Donaldson Iron Company, Emaus. Main office, 226 Walnut st., Philadelphia. Daily capacity, 50 tons.

Fisher, (John J.), Allentown. Daily capacity, 100 tons.

Hazleton Iron Works, Allison, John & Co., Hazleton. Daily melting capacity, 12 tons.

Jackson and Woodin Manufacturing Company, Berwick. Daily melting capacity, 30 tons.

Mellert Foundry and Machine Company, Reading, Berks county. Daily melting capacity, 75 tons.

National Foundry and Pipe Works Limited, Scottdale. Daily melting capacity, 30 tons.

Reading Foundry Company Limited, Reading. Daily melting capacity, 60 tons.

Sayre Pipe Foundry, Sayre. Daily melting capacity, 30 tons.

VIRGINIA—2.

Hill City Pipe Works, Glamorgan Iron Company, Lynchburg. Daily melting capacity, 15 tons.

Tredegar Company, Richmond. Daily melting capacity, 25 tons.

ALABAMA—1.

Birmingham Iron Works, Birmingham.

TEXAS—1.

Rusk Penitentiary, State of Texas, Rusk P. O., Cherokee county.

KENTUCKY—2.

Cincinnati and Newport Iron and Pipe Company, Newport. Daily melting capacity, 200 tons.

Dennis Long & Co., Louisville. Daily melting capacity, 250 tons.

TENNESSEE—2.

Chattanooga Foundry and Pipe Works, Chattanooga.

South Pittsburg Pipe Works, South Pittsburg.

OHIO—3.

Lake Shore Foundry, Cleveland. Daily melting capacity, 100 to 175 tons.

New Philadelphia Pipe Works Company, New Philadelphia. Daily melting capacity, 75 tons.

Ohio (The) Pipe Company, Columbus. Daily melting capacity, 75 tons.

MISSOURI—1.

Shickle, Harrison, and Howard Company, St. Louis.

MICHIGAN—1.

Detroit Pipe and Foundry Company, Detroit.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo.

UNITED STATES.

Total number of cast-iron pipe works in the United States: 30.

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ADDENDA.

The information given below was received too late for insertion in its proper place in the Directory.

J. Wesley Pullman, 238 South Third st., Philadelphia, is selling agent of the Warwick Iron Company. (Page 16.)

Lowry, Eichelberger & Manning have succeeded James Eichelberger & Co. as operators of Hopewell Furnace. (Page 30.)

The officers of the Sheffield Furnace Company are now as follows: O. O. Nelson, President, Montgomery, Ala.; Alfred H. Moses, Vice-President, Sheffield, Ala.; Henry C. Moses, Secretary and Treasurer, Montgomery, Ala. (Page 40.)

The Marshall Car-wheel and Foundry Company is making arrangements to build a new furnace stack, 55 x 9½. The office of the President of the company is now at the works. (Page 43.)

The Oregon Iron and Steel Company is pushing the completion of its new furnace. When completed it will have three Whitwell stoves, and an annual capacity of 15,000 net tons. The officers are S. G. Reed, President; Wm. M. Ladd, Vice-President; Martin Winch, Secretary and Treasurer; F. C. Smith, General Manager, all at Portland, Oregon. E. W. Crichton, Superintendent, Oswego. The old furnace has been abandoned. (Page 67.)

The Scottdale Iron and Steel Company Limited is now operating the Scottdale Iron Works. (Page 129.)

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