





DIRECTORY

TO THE

IRON AND STEEL WORKS

OF THE

UNITED STATES.

EMBRACING THE

BLAST FURNACES, ROLLING MILLS, STEEL WORKS,
CATALAN FORGES AND BLOOMARIES IN
EVERY STATE AND TERRITORY.

PREPARED AND PUBLISHED BY

THE AMERICAN IRON AND STEEL ASSOCIATION.

CORRECTED TO SEPTEMBER 1, 1873.

PHILADELPHIA:

No. 265 SOUTH FOURTH STREET.

1878.

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1878

Directory to the iron and
steel works of the United
States

Philadelphia, Pa. : The
Association,

PHILADELPHIA:

JAMES B. CHANDLER'S STEAM PRINTING ESTABLISHMENT,

NOS. 306 & 308 CHESTNUT STREET.

P R E F A C E .

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IN November, 1873, a classified list of rail mills and blast furnaces in the United States was presented by the American Iron and Steel Association to the iron trade of the country in a thin pamphlet of 45 pages. It did not contain any mention of mills that roll only bar iron, nor of steel works, forges, or bloomeries. Small as the pamphlet was, its compilation was made under many disadvantages. In September of the following year a complete list of all the iron and steel works in the country was published in a pamphlet of 104 pages. In February, 1876, this list was thoroughly revised and printed in a pamphlet of 136 pages, meeting, in connection with the annual statistical report of the Association for the year, a patriotic demand for detailed information concerning the extent and variety of the iron enterprises of the country. Owing to the financial reverses which have since overtaken so many of our iron and steel manufacturers, and owing also to the many scientific and other changes which have been introduced by manufacturers who have weathered the financial storm, it has been found necessary again to revise this list. This revision, embraced in a pamphlet still stouter than any of its predecessors, is now presented to the American iron trade. It contains 156 pages. In comparing it with the thin pamphlet of 1873 we realize how fully we have since enjoyed the confidence of the American iron trade, and how vast an industry the manufacture of iron and steel in our country has become.

The Directory which is now published will be found to contain many features which are entirely new, although its leading features do not vary from those of its predecessors. The new features largely embrace a better classification of the steel works of the country and of the works that manipulate steel. In the description of furnaces we have incorporated wherever possible the quality and brands of iron made by each furnace, and the kind of ore used. In the description of rolling mills an effort has been made to obtain information concerning the specialties of each mill and the brands used. In the description of steel works a fairly successful effort has been made to ascertain the number of pots in each establishment, and its brands and specialties.

The following is a summary statement of the number and capacity of the iron and steel works which are described in the Directory.

Wm. D. Clapp

Number of completed Blast Furnaces, September 1, 1878, . . .	698
Annual capacity of all the Furnaces in pig iron, net tons, . . .	5,868,000
Annual capacity of Bituminous Furnaces in pig iron, net tons, . . .	2,587,000
Annual capacity of Anthracite Furnaces in pig iron, net tons, . . .	2,281,000
Annual capacity of Charcoal Furnaces in pig iron, net tons, . . .	1,000,000
Number of Rolling Mills, Sept. 1, 1878,	340
Number of Single Puddling Furnaces in Rolling Mills, (a double furnace counting as two single ones,)	4,463
Number of Puddling Furnaces in Steel Works and Bloomaries, . . .	51
Total number of Single Puddling Furnaces,	4,514
Number of Trains of Rolls in Rolling Mills,	1,252
Number of Trains of Rolls in Steel Works of all kinds, . . .	95
Total number of Trains of Rolls,	1,347
Annual capacity of all Rolling Mills in finished iron, net tons, . . .	4,461,000
Annual capacity of all the Rail Mills in heavy rails, net tons, . . .	1,972,000
Number of Bessemer Steel Works, Sept. 1, 1878,	11
Number of Bessemer Converters,	22
Annual capacity in ingots, net tons,	750,000
Number of Open-Hearth Steel Works, Sept. 1, 1878,	14
Number of Open-Hearth Furnaces,	22
Annual capacity in ingots, net tons,	100,000
Number of Crucible Cast Steel Works, Sept. 1, 1878,	38
Number of Steel Melting Pots,	3,400
Annual capacity in ingots, net tons,	90,000
Number of Miscellaneous Steel Works, Sept. 1, 1878,	8
Annual capacity of merchantable steel, net tons,	22,000
Number of Steel Manipulating Works, Sept. 1, 1878,	23
Number of Catalan Forges, (blooms from ore, Sept. 1, 1878,) . . .	64
Annual capacity in blooms and billets, net tons,	65,000
Number of Bloomaries, Sept. 1, 1878, (blooms from pig iron,) . . .	58
Annual capacity in blooms, net tons,	65,000

In stating above the producing capacity of the iron and steel works of the country we have given the aggregates of individual returns of every establishment. It should be understood, however, that some of these aggregates can never be realized in practice. Blast furnaces and rolling mills can not be uniformly operated to their full capacity, nor can all of them be in operation at the same time. Upon the other hand, the working capacity of all the steel works, and of the forges and bloomaries, is not greatly overstated in the summary, the comparative smallness of their number permitting greater accuracy than is possible in dealing with the capacity of blast furnaces and rolling mills.

PHILADELPHIA, October 1, 1878.

TABULATED STATEMENT

OF THE NUMBER AND CAPACITY OF THE BLAST FURNACES AND ROLLING MILLS IN THE UNITED STATES. TONS OF 2,000 POUNDS.

Of the aggregate furnace capacity of the United States the bituminous coal or coke furnaces represent 2,587,000 net tons; anthracite furnaces, 2,281,000 net tons; and charcoal furnaces, 1,000,000 net tons: total, 5,868,000 net tons. There are, connected with crucible steel works in Connecticut, 2 single puddling furnaces; in New Jersey, 10; in Pennsylvania, 35; in Tennessee, 1; and, connected with a bloomery in Pennsylvania, 3. These 51 single puddling furnaces, added to the 4,463 single puddling furnaces connected with the rolling mills in the United States, as shown in the table below, make a total of 4,514 single puddling furnaces in this country.

STATES.	BLAST FURNACES.				ROLLING MILLS.			
	Districts.		Totals.		Number of Mills.	Whole number of Single Puddling Furnaces.	Total Annual Rolling Capacity, including Iron and Steel Rails.	Annual Rolling Capacity of Heavy Rail Mills.
	No. of Completed Stacks.	Annual Capacity.	No. of Completed Stacks.	Annual Capacity.				
Maine.....	1	6,000	2	26	25,000	15,000		
New Hampshire.....	1	4,000	1	10	20,000	20,000		
Vermont.....	6	25,500	24	178	190,000	40,000		
Massachusetts.....	10	35,000	7	11	24,000			
Rhode Island.....	58	536,000	24	300	347,500	156,000		
Connecticut.....	19	204,000	14	152	115,000	15,000		
New York.....								
New Jersey.....								
Pennsylvania—								
Lehigh Valley.....	51	625,000						
Schuylkill Valley.....	49	438,000						
Upper Susquehanna District.....	25	227,500						
Lower Susquehanna District.....	37	262,500						
Shenango Valley.....	30	357,000						
Allegheny County.....	12	302,000						
Miscellaneous Bituminous.....	34	306,000						
Charcoal.....	37	78,000						
Total Pennsylvania.....	275	2,597,000	138	2,187	1,830,000	750,000		
Delaware.....			8	35	40,000			
Maryland.....	24	95,000	6	106	94,200	58,000		
District of Columbia.....			1		5,000			
Virginia.....	33	74,500	5	53	56,000			
North Carolina.....	7	11,000						
Georgia.....	11	43,000	2	15	23,500	15,000		
Alabama.....	12	78,500	1	4	1,000			
Texas.....	1	1,500						
West Virginia.....	11	100,000	8	180	116,000	25,000		
Kentucky.....	22	129,000	10	140	162,000	15,000		
Tennessee.....	22	102,500	4	32	41,500	28,000		
Ohio.....	103	948,000	46	652	632,000	250,000		
Indiana.....	7	59,000	10	133	124,000	80,000		
Illinois.....	12	252,500	10	95	253,000	305,000		
Michigan.....	26	225,500	4	31	35,500	18,000		
Wisconsin.....	15	117,000	1	34	69,800	45,000		
Missouri.....	18	211,000	6	74	88,000	50,000		
Kansas.....			2		51,000	48,000		
Colorado.....			1		9,000	9,000		
Wyoming Territory.....			1		15,000	15,000		
Utah Territory.....	3	8,500						
California.....			1	3	30,000	15,000		
Oregon.....	1	4,000						
Total.....	698	5,868,000	340	4,463	4,461,000	1,972,000		

TABULATED STATEMENT

OF THE NUMBER AND CAPACITY OF THE STEEL WORKS, CATALAN FORGES, AND BLOOMARIES IN THE UNITED STATES. NET TONS.

The Bessemer steel works have 22 converters; no new works building. The Siemens open-hearth steel works now completed have 22 open-hearth furnaces; 4 more open-hearth furnaces are building in Pennsylvania, 2 in Illinois, and 1 each in Ohio and Tennessee. When these furnaces are completed there will be 19 establishments manufacturing open-hearth steel, with an annual capacity of 150,000 net tons of ingots. The crucible cast steel works are included under the head of "Steel Converting Works other than Bessemer and Open-Hearth," and they contain about 3,400 pots; they have an annual capacity of about 90,000 net tons of ingots. Catalan forges make blooms or bar iron direct from the ore. Bloomaries make blooms from pig or scrap iron.

STATES.	Bessemer Steel Works.		Open-Hearth Steel Works.		Steel Converting Works other than Bessemer and Open-Hearth.		Catalan Forges.		Bloomaries.	
	Number of Works.	Annual Capacity. Ingots.	Number of Works.	Annual Capacity. Ingots.	Number of Works.	Annual Capacity.	Number of Works.	Annual Capacity.	Number of Works.	Annual Capacity.
New Hampshire.....			1							
Vermont.....			1				3	2,000		
Massachusetts.....			2		1	1,000			1	500
Rhode Island.....			1							
Connecticut.....					3	3,000				
New York.....	1				5	5,400	24	57,000	2	3,000
New Jersey.....			1		5	13,600	1	1,500	5	4,000
Pennsylvania.....	5		4		22	83,000			36	40,000
Maryland.....		750,000		100,000	1	800			1	6,000
Virginia.....							4	500	8	5,500
North Carolina.....							8	1,000	1	400
West Virginia.....									1	900
Kentucky.....					1	500				
Tennessee.....			1		1	200	23	1,800		
Ohio.....	1		3		7	4,500			1	1,500
Illinois.....	3									
Missouri.....	1						1	1,200	2	3,200
Total.....	11	750,000	14	100,000	46	112,000	64	65,000	58	65,000

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THE IRONWORKS OF THE UNITED STATES. --- BLAST FURNACES. ---

NOTE.—In this book the names of establishments are given first, whenever they have distinctive names, followed by the names of owners and their post-office addresses. Where the kind of power is not mentioned, steam-power will be understood. The size of each furnace stack is indicated by two numbers connected by the character "x;" the first number being the height of the stack in feet, and the second number being its diameter in feet at the bosh.

MAINE.

Katahdin Iron Co., Bangor. Furnace in Piscataquis county. One stack, 50 x 9½, built in 1846, rebuilt in 1874, and enlarged in 1877; hot or cold blast; bell-and-hopper top; fuel, charcoal; water-power; annual capacity, 6,000 net tons. This furnace is supplied with limonite ore obtained about a mile from the works, yielding from 55 to 60 per cent. Pig iron branded "Katahdin." O. W. Davis, Jr., Treasurer and Manager.

Number of furnaces in Maine: 1 charcoal stack.

VERMONT.

Pittsford Furnace, Naylor & Co., lessees, (from Estate of J. Prichard,) Pittsford, Rutland county. Office, 6 Oliver st., Boston, Mass. One stack, 40 x 10, built in 1844; hot blast; water-power; fuel, charcoal; formerly Vermont Iron Co.; annual capacity, 4,000 net tons. Use Chateaugay self-fluxing magnetic ore. Brand, "Pittsford charcoal." *See Rolling Mills in Massachusetts.*

Number of furnaces in Vermont: 1 charcoal stack.

MASSACHUSETTS.

ANTHRACITE.

Pomeroy Iron Works, West Stockbridge, Berkshire county. One stack, 50 x 14, built in 1850; burned and rebuilt in 1872; annual capacity, 10,250 net tons. Product, foundry pig iron, made from a mixture of $\frac{1}{3}$ magnetic ore from Witherbees, Sherman & Co.'s Port Henry mines, and $\frac{2}{3}$ hematite ore from the neighborhood of the furnace. Brand, "Pomeroy." W. M. Kniffin, Superintendent and Treasurer.

CHARCOAL.

Lanesborough Furnace, John L. Colby, Lanesborough, Berkshire county. One stack, 33 x 9 $\frac{1}{2}$, built in 1847; hot blast; open top; annual capacity, 3,500 net tons. Uses local brown hematite ore. Specialty, car-wheel pig iron.

Lenox Iron Works, Taylor, Church & Coffing, Lenox Furnace, Berkshire county. One stack, 32 x 9, built in 1765 and rebuilt in 1837; warm blast; water-power. Charles J. Taylor, Treasurer.

Richmond Iron Works, West Stockbridge, Berkshire county. Three stacks, all in Berkshire county: Richmond Furnace, at West Stockbridge, an elliptical stack, 32 x 11 $\frac{1}{2}$ and 8 $\frac{1}{2}$, built in 1829; Van Deusenville Furnace, at Van Deusenville, 32 x 9, built in 1834, run by water-power; and Cheshire Furnace, at Cheshire, 36 x 9, built in 1850. Use red and brown hematites, mined in the neighborhood. Product, foundry pig iron for cannon, car-wheels, and machinery. R. A. Burget, Manufacturing Agent.

Number of furnaces in Massachusetts: 6 stacks; 1 anthracite and 5 charcoal stacks.

CONNECTICUT.

CHARCOAL.

Canaan Furnaces, Barnum Richardson Company, Lime Rock, Litchfield county. Three stacks, each 32 x 9, one built in 1840, one in 1847, and the last in 1872; hot blast; water-power; total annual capacity, 12,500 net tons. Use Salisbury brown hematite ore exclusively. Product, pig iron for car-wheels and malleable purposes, known as "Salisbury iron." Wm. H. Barnum, President, and S. P. Ensign, Secretary.

Chapinville Furnace, Landen & Co., Chapinville, Litchfield county. One stack, 32 x 9, built in 1825; hot blast; water-power; open top; annual capacity, 3,000 net tons. Horace Landen, Manager.

Cornwall Bridge Iron Co., Cornwall Bridge, Litchfield county. One stack, 32 x 9, built in 1833; hot blast; water-power. Wm. H. Barnum, President, Lime Rock.

Hunts Lyman Iron Co., Huntsville, Litchfield county. One stack, 32

x 9, built in 1847; hot blast; water-power; open top; annual capacity, 3,500 net tons. Moses Lyman, President; Samuel W. Bradley, Secretary; Wm. H. Barnum, Treasurer, Lime Rock.

Kent Furnace, Kent Iron Co., Kent, Litchfield county. One stack, 31 x 9, built in 1849; warm blast; water-power; closed top; annual capacity, 4,000 net tons. Burrett Eaton, President; John Hopson, Jr., Secretary; John Hopson, Treasurer and Manager.

Lime Rock Iron Co., Lime Rock, Litchfield county. One stack, 32 x 9, built in 1864; warm blast; water-power; annual capacity, 3,500 net tons. Salisbury ore used. Product, pig iron for car-wheels and malleable purposes. Samuel S. Robbins, President; William H. Barnum, Treasurer; Milo B. Richardson, Secretary.

Sharon Valley Iron Co., Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; hot blast; water-power. Wm. H. Barnum, President, Lime Rock.

Shepaug Iron Co, R. E. Day, President, Hartford. Furnace at Roxbury, Litchfield county. One stack, 40 x 9, built in 1866; hot blast. Not in blast since 1872. Held for sale.

Number of furnaces in Connecticut: 10 charcoal stacks.

NEW YORK.

ANTHRACITE.

Burden Iron Works, H. Burden & Sons, Troy, Rensselaer county. Two stacks, each 60 x 16, built in 1865 and 1867; closed tops; total annual capacity, 30,000 net tons. Use magnetic ore from Lake Champlain and Vermont, and hematite ore from Eastern New York. *See Rolling Mills.*

Cedar Point Furnace No. 1, Cedar Point Iron Co., Port Henry, Essex county. One stack, 70 x 17, built in 1872-3, first put in blast August 12, 1875; blast heated by four 22-foot Whitwell stoves; bell-and-hopper top; annual capacity, 18,000 net tons of Bessemer pig iron. Uses Lake Champlain ores. Brand, "Cedar Point." Silas H. Witherbee, President; George R. Sherman, Vice-President; Hosea B. Willard, Secretary and Treasurer; Thomas F. Witherbee, Manager.

Charlotte Furnace, Rochester Iron Manufacturing Co., Henry C. Roberts & Co., Rochester, Monroe county. One stack, 50 x 14, situated 6 miles from Rochester, at the mouth of the Genesee river, built in 1868; closed top; annual capacity, 10,500 net tons. Specialty, foundry pig iron.

Clinton Furnace, Kirkland, Oneida county. Owned by Irvin A. Williams, of Utica, and Theodore W. Dwight, of New York. One stack, 48 x 13, built in 1873; water-power; annual capacity, 6,000 net tons. Out of blast for several years.

- Clove Furnace, Peter P. Parrott, Greenwood Iron Works, Orange county. One stack, 55 x 16, built in 1854; closed top; steam and water-power; annual capacity, 11,500 net tons. Ores used are magnetic ores, found within 8 miles of the furnace, except that from one mine about 20 miles distant. Product, foundry pig iron for fine hardware and stove work. Brand, "Clove." *See Greenwood (charcoal) Furnace.*
- Cold Spring Furnace, Cold Spring, Putnam county. Office, 110 Broadway, New York. One stack, 60 x 15½, built in 1863. Formerly Phillips Iron Works. Owned by Geo. H. Potts and John P. Brock.
- Columbia Furnace, Albany and Rensselaer Iron and Steel Co., Troy. Furnace at Hudson, Columbia county. One stack, 40 x 14, built about 1860; annual capacity, 10,000 net tons. *See Fort Edward Furnace. See Rolling Mills.*
- Crown Point Furnaces, Crown Point Iron Co., Crown Point, Essex county. Two stacks, situated on the bank of Lake Champlain, each 60 x 16, built in 1873; 3 Siemens-Cowper-Cochrane fire-brick stoves. Product, Bessemer pig iron. J. T. Hammond, President, and A. L. Inman, General Manager and Treasurer. *See Forges.*
- Dutchess Furnace, Clove Spring Iron Works, Sylvan Lake, Dutchess county. Agents, Crocker Brothers, 32 Cliff st., New York. One stack, 44 x 12½, built in 1873 for charcoal, and changed to anthracite in 1877; bell-and-hopper top; annual capacity, 7,000 net tons. *See Clove Spring (charcoal) Furnace.*
- Elmira Iron and Steel Rolling Mill Co., Elmira, Chemung county. Two stacks, each 56 x 16, built in 1872; one put in blast Oct. 5, 1872, and the other subsequently; total annual capacity, 30,000 net tons. The ores used are hematite from Jefferson county, New York, and Centre county; Pa., and Lake Champlain and Glendower magnetic. The Glendower ore comes from the Company's own mines, north of Kingston, in Frontenac county, Canada; it is used as their leading ore, is rich in metallic iron, gives great strength to the pig, and is a good Bessemer ore, being free from phosphorus and sulphur. *See Rolling Mills.*
- Fallkill Iron Co., A. Tower, Agent, Poughkeepsie, Dutchess county. Two stacks, each 60 x 16, built in 1860; total annual capacity, 25,000 net tons. The ore used is a mixture of ½ Dutchess county brown hematite, ¼ Lake Champlain magnetic, and ¼ Forest of Dean, Orange county.
- Fletcher Furnace, Pratt & Co., Buffalo, Erie county. One stack, 47 x 14, built in 1863, and blown in April 8, 1864; closed top; ore, principally Lake Superior, and remainder from Lake Champlain and Wayne

county, New York; annual capacity, 12,000 net tons. Brand, "Fletcher." *See Rolling Mills.*

Fort Edward Furnace, Albany and Rensselaer Iron and Steel Co., Troy. Furnace at Fort Edward, Washington county. One stack, 50 x 15, built in 1853; water-power; annual capacity, 11,000 net tons. *See Columbia Furnace. See Rolling Mills.*

Franklin Iron Works, Franklin Iron Works P. O., Oneida county. Two stacks, Franklin and De Wolf, each 54 x 14, built in 1870 and 1871; closed tops; fuel, anthracite coal and coke; total annual capacity, 20,000 net tons. Ore used is fossil ore from Oneida county, obtained from 1½ to 5 miles from the works. Product, pig iron for stove plates and small castings. O. B. Matteson, President; E. B. Armstrong, Vice-President; C. H. Smyth, Secretary and Superintendent; Delos De-Wolf, Treasurer.

Hudson Iron Works, Hudson Iron Co., Hudson, Columbia county. Two stacks, each 49 x 15½, built in 1851; closed tops; total annual capacity, 22,000 net tons. Use a mixture of hematite ore 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. Brand, "Hudson." J. W. Hoysradt, President and General Agent, and S. Seymour, Secretary.

Jagger Iron Works, Jagger Iron Co., Albany. Works on Van Rensselaer island. Two stacks, each 60 x 16, built in 1871; total annual capacity, 25,000 net tons. Formerly Corning Iron Works. Use Lake Champlain magnetic ore, and hematite ore from Columbia county, New York, and Western Massachusetts. Specialty, pig iron for stove founders. James Hendrick, President.

Manhattan Iron Works, Manhattan Iron Co., Manhattanville, New York City. Two stacks, 49 x 12 and 49 x 13, built in 1851 and 1857; total annual capacity, 17,000 net tons. Use magnetic ore from Lake Champlain and hematite ore from Sharon, on the New York and Harlem Railroad. Product, neutral pig iron, suitable for foundry or mill purposes. B. W. Van Voorhis, President, and Wm. W. Van Voorhis, Treasurer.

Napanoch Furnace, Napanoch, Ulster county. One stack, 46 x 12, built prior to 1854; put in blast in July, 1873, after a long rest; annual capacity, 6,000 net tons. Now idle and offered for sale by Henry Bange, 94 Gold st., New York.

Niagara River Iron Co., Buffalo. Furnace at Ironton, Niagara county. One stack, 60 x 16, built in 1873, and put in blast Nov. 7, 1873; annual capacity, 12,000 net tons. T. L. Danforth, Treasurer.

Olcott Iron Manufacturing Co., Albany. Agents, Crocker Brothers, 32

Cliff st., New York. Two stacks, each 60 x 16, built in 1873-4; total annual capacity, 28,000 net tons. Abm. Van Vechten, President; Albion Ransom, Vice-President; Wm. R. Hills, Secretary and Treasurer.

Onondaga Iron Co., Geddes, Onondaga county. Two stacks, each 65 x 15; No. 1 was built in 1869-70, and blown in June 17, 1870; No. 2 was built in 1872, and blown in November 14, 1872; total annual capacity, 28,000 net tons. Use Jefferson county "Sterling" hematite, Lake Champlain magnetic, and Wayne county fossil ores. Fuel, 12½ per cent. Connellsville coke, and remainder anthracite. Product known as "Onondaga" pig iron. J. J. Belden, President; R. N. Gere, Vice-President; Wm. H. H. Gere, Secretary and Treasurer.

Ontario Furnace, Ontario Iron Co., Rochester, Monroe county. Furnace at Furnaceville, Wayne county. One stack, 50 x 11, first put in operation in October, 1870; open top; annual capacity, 6,000 net tons. Makes stove-plate iron from Wayne county ore and St. Lawrence county ore. James Brackett, President and Manager; Isaac Palmer, Vice-President; W. H. Averell, Secretary; J. S. Averell, Treasurer.

Peekskill Furnace, Flint, Clark & Co., Peekskill, Westchester county. One stack, 60 x 16, built in 1853, and rebuilt in 1874; bell-and-hopper top; total annual capacity, 12,000 net tons. Uses ¾ magnetic and ¼ hematite ore, mined in Putnam and Dutchess counties. Specialty, foundry pig iron. Brand, "Peekskill." E. E. Flint, General Manager, 33 Broadway, New York.

Port Henry Furnaces, Bay State Iron Co., W. T. Foote, Agent, Port Henry, Essex county. General office, 2 Pemberton Square, Boston. Selling Agency, Crocker Brothers, 32 Cliff st., New York. Two stacks, each 66 x 16, built in 1853 and 1861; rebuilt in 1871 and 1868, respectively; total annual capacity, 28,000 net tons. Use a mixture of ores, ⅔ Port Henry magnetic, and ⅓ hematite from Rossie Works in St. Lawrence county. *See Massachusetts Rolling Mills.*

Poughkeepsie Iron Co., A. Tower, Agent, Poughkeepsie. Two stacks, 43 x 14 and 46 x 15, built in 1848 and 1854, respectively; total annual capacity, 20,000 net tons. The ore used is a mixture of ⅓ Dutchess county brown hematite, ⅓ Lake Champlain magnetic, and ⅓ Forest of Dean, Orange county.

Sterling Iron and Railway Co., 42 Pine st., P. O. Box 1,384, New York City. Furnaces in Orange county. Two stacks, Sterling, 42 x 13, built in 1848, and Southfield, 45 x 12, built in 1806. Product, some foundry, mostly mill pig iron, from all magnetic ores, mined near the furnaces. Brand, "Sterling." A. W. Humphreys, Treasurer.

Union Iron Works, Union Iron Co., Buffalo, Erie county. Three

stacks: No. 1, Pioneer, 50 x 17, built in 1861; No. 2, Excelsior, 50 x 15, built in 1862; No. 3, Monitor, 50 x 14, built in 1865; all have closed tops; total annual capacity, 28,000 net tons. Use hematite, specular, and magnetic ores, obtained from St. Lawrence county, New York, and from the Lake Superior region. Specialty, mill pig iron. Brand, "Union." *See Rolling Mills.*

Number of anthracite furnaces: 42 stacks.

CHARCOAL.

Alpine Furnace, Z. H. Benton, Antwerp, Jefferson county. Furnace at Diana, Lewis county. One stack, 40 x 9, built from 1845 to 1850; hot blast; water-power; capacity, 20 net tons a day; furnace lands comprise 40,000 acres.

Beckley Iron Works, George Adam, Chatham Village, Columbia county. One stack, 32 x 9, built in 1873; put in blast in July, 1873; hot blast; annual capacity, 4,500 net tons. Ore used is brown hematite from Columbia and Dutchess counties. Product, pig iron for car-wheels.

Carthage Furnace, Carthage Iron Co., Carthage, Jefferson county. One stack, 36 x 9, built in 1818, and rebuilt in 1872; warm blast; open top; water-power; annual capacity, 3,500 net tons. Uses local hematite ore. Product, car-wheel and foundry pig iron. R. N. Gere, President; L. H. Mills, Vice-President; C. F. Bissell, Secretary and Treasurer.

Clove Spring Furnace, Clove Spring Iron Works, Sylvan Lake Dutchess county. Agents, Crocker Brothers, 32 Cliff st., New York. One stack, 32 x 9, built in 1830; warm blast; steam and water-power; annual capacity, 3,500 net tons. *See Dutchess (anthracite) Furnace.*

Copake Iron Works, Frederick Miles, Copake Iron Works, Columbia county. One stack, 32 x 9, built in 1872; warm blast; steam and water-power; annual capacity, 4,400 net tons.

Fullerville Iron Works, George H. Clarke, Fullerville, St. Lawrence county. Selling agency, Crocker Brothers, 32 Cliff st., New York. One stack, 33 x 8½, built in 1833; water-power; annual capacity, 2,000 net tons; put in blast in 1877 after having been idle for many years.

Greenwood Furnace, Peter P. Parrott, Greenwood Iron Works, Orange county. One stack, 42 x 9, built in 1813; warm blast; water-power; not in blast since September, 1871. Only charcoal furnace in Southern New York or Northern New Jersey. *See Clove (anthracite) Furnace.*

Jefferson Iron Co., Antwerp, Jefferson county. Agents, Crocker Brothers, 32 Cliff st., New York. Two stacks: Sterlingbush Furnace, at Sterlingbush, Lewis county, 32 x 9, built in 1852; Sterlingville Furnace, at Sterlingville, Jefferson county, 30 x 9, built in 1866; cold blast; water-power; total annual capacity, 3,000 net tons. Use local red hematite ore. Specialty, car-wheel pig iron. *See Bloomaries.*

- Millerton Iron Co., Irondale, Dutchess county. One stack, 32 x 9½; very old; repaired in 1864; hot blast; annual capacity, 4,000 net tons. W. H. Barnum, President; Walter Phelps, Secretary and Treasurer.
- Norwich Furnace, J. & N. C. Scoville, Buffalo. Furnace at Norwich, Chenango county. One stack, 32 x 9, built in 1856 and repaired in 1873; hot blast; annual capacity, 4,000 net tons.
- Phoenix Furnace, C. S. Maltby, Millerton, Dutchess county. One stack, 32 x 9½, built in 1840; hot blast; annual capacity, 3,500 net tons.
- Plattsburgh Iron Works, C. F. Norton, Plattsburgh, Clinton county. One stack, 45 x 9, built in 1877-8; first blown in April 7, 1878; closed top; annual capacity, 4,500 net tons. *See Rolling Mills. See Forges. See Bloomaries.*
- Port Leyden Furnaces, S. C. Thompson, Boonville, Oneida county. Works at Port Leyden, Lewis county. Two stacks, 40 x 9 and 32 x 9, built in 1864; hot blast; water-power; open tops; total annual capacity, 7,000 net tons. Ore from Jefferson county. Not in blast since Oct. 1, 1874.
- Wassaic Furnace, N. Gridley & Son, Wassaic, Dutchess county. One stack, 32 x 9½, built in 1826; warm blast; water-power; annual capacity, 4,000 net tons. Uses Amenia hematite ore, mined in the neighborhood. Product, pig iron for car-wheels, chilled rolls and malleable castings. Brand, "Wassaic."
- Number of charcoal furnaces: 16 stacks. Total number of furnaces in New York: 58 stacks.

NEW JERSEY.

ANTHRACITE.

- Andover Iron Works, Andover Iron Co., Joseph C. Kent, Superintendent, Phillipsburg, Warren county. Office, 407 Walnut st., Philadelphia: J. Wesley Pullman, Secretary. Three stacks: two, 60 x 18, and one, 75 x 18, built in 1848; total annual capacity, 50,000 net tons. Use New Jersey magnetic ore from their own mines. Product, all grades of pig iron, with special qualities for plates and nails. Brand, "Andover."
- Boonton Iron Works, Estate of J. Cowper Lord, Boonton, Morris county. Agents, Fuller Bros. & Co., 135, 137 and 139 Greenwich st., or P. O. Box 2,068, New York. Two stacks, 70 x 14 and 60 x 16, built in 1848 and 1868, respectively; bell-and-hopper tops; steam and water-power; total annual capacity, 25,000 net tons. Idle for several years. *See Rolling Mills.*
- Franklin Iron Co., Franklin Furnace P. O., Sussex county. One stack, 67 x 23; completed in October, 1873, and blown in January 1, 1874;

closed top. Moses Taylor, President; E. F. Hatfield, Jr., Treasurer, 52 Wall st., New York; W. W. Pierce, Secretary.

Hackettstown Furnace, Hackettstown Iron and Manufacturing Co., Hackettstown, Warren county. One stack, 55 x 15, built in 1874-5, and put in blast in 1875; annual capacity, 10,000 net tons.

Jersey Spiegel and Iron Co., Chester, Morris county. One stack, 40 x 11, building in 1878, to make spiegeleisen from native ore. W. J. Taylor, President. Alfred Earnshaw, Agent, 200 Walnut Place, Philadelphia.

Musconetcong Iron Works, Musconetcong Iron Co., Stanhope, Sussex county. Selling agency, Crocker Brothers, 32 Cliff st., New York. Two stacks, 70 x 17 and 80 x 20, built in 1864 and 1869, and blown in in 1866 and 1871; closed tops; total annual capacity, 40,000 net tons. Use magnetic ore and some limonite, mined in Morris, Sussex and Warren counties. Specialty, No. 2 foundry and gray forge pig iron. Brand, "Musconetcong." President, A. Pardee, 303 Walnut st., Philadelphia; Secretary and Treasurer, H. H. Wilson, Philadelphia; Superintendent, E. S. Moffat, Stanhope, N. J.

New Jersey Zinc Co., Newark, Essex county. Office, 61 Maiden Lane, New York. Three stacks, each 20 x 7; built in 1855, 1863 and 1871; open tops; combined annual capacity, 6,600 net tons. Manufacture spiegeleisen at these furnaces from zinc residuum. President, Edward Baker; Vice President, A. B. Graves; Secretary and Treasurer, A. H. Farlin.

Oxford Iron Works, Oxford Iron Co., Oxford, Warren county. Two stacks, 36 x 10 and 50 x 18, built in 1742 and 1871, respectively; combined annual capacity, 17,000 net tons. Use magnetic ore mined near the works. Product is worked up into nails, etc., by the Company, a small quantity only of foundry pig iron being made and sold. *See Rolling Mills.*

Pequest Furnace, Pequest Mining and Manufacturing Co., Oxford, Warren county. One stack, 50 x 14, built in 1874; blown in October 27, 1874; closed top; annual capacity, 8,000 net tons. Use magnetic ore mined on the furnace property. Eli J. Saeger, President, Allentown, Pa.; Henry J. Santerman, Agent, Oxford, N. J.

Port Oram Furnace, Port Oram Iron Co., Port Oram, Morris county. One stack, 60 x 15, built in 1868, and first blown in in 1869; closed top; annual capacity, 11,000 net tons. The North Jersey Iron Co. ran this furnace in 1877, mainly on spiegeleisen, but surrendered it to its owners in March, 1878. It is now standing idle.

Ringwood Furnaces, Cooper, Hewitt & Co., Ringwood, Passaic county. Office, 17 Burling Slip, New York. Two stacks, 48 x 13 and 65 x 16;

open tops; water-power; not in blast for several years. The former was recently altered from charcoal to anthracite; the latter was partly torn down to be rebuilt for anthracite. A recent letter from the proprietors says "these works are not abandoned, and will be put in blast whenever the condition of trade will warrant."

Secaucus Iron Co., Secaucus, Hudson county. One stack, 65 x 17, completed in 1877. A. Pardee, President, 303 Walnut st., Philadelphia; W. Merston, Secretary, 111 Broadway, New York; E. S. Moffat, Superintendent, Stanhope, N. J.

Number of furnaces in New Jersey: 19 completed stacks, and 1 building.

PENNSYLVANIA.

LEHIGH VALLEY ANTHRACITE.

Allentown Iron Works, Allentown Iron Co., Allentown, Lehigh county. Office, 230 South Third st., Philadelphia. Five stacks: No. 1, 53½ x 14½, built and blown in in 1846; No. 2, 60 x 15½, built and blown in in 1846; No. 3, 53½ x 15, built in 1853 and blown in in 1854; No. 4, 53½ x 16½, built in 1854 and blown in in 1855; No. 5, 60 x 17, built in 1872 and blown in in 1873; 4 open tops and 1 closed; total annual capacity, 60,000 net tons. Use magnetic ore from New Jersey and hematite from Lehigh and Berks counties, Pa. Foundry pig iron is a specialty. Brand, "Allentown." President, Joseph Cabot; Vice-President, Pemberton S. Hutchinson; Secretary, Harry Cabot; Manager, Samuel B. Lewis.

Allentown Rolling Mill Co., Allentown. Office, 303 Walnut st., Philadelphia. Two stacks, each 68 x 15, built in 1864; open tops; total annual capacity, 20,000 net tons. Formerly owned by Roberts Iron Co. *See Rolling Mills.*

Bethlehem Iron Co., Bethlehem, Northampton county. Six stacks: No. 1, 62 x 16, built in 1863; No. 2, 70 x 16½, built in 1867; No. 3, 50 x 13, built in 1868; No. 4, 70 x 17½, built in 1874-5; No. 5, 70 x 18½, built in 1874-5; all have closed tops; specialty, Bessemer pig iron; use local and foreign hematites and magnetic ores; total annual capacity, 75,000 net tons. No. 6, 27 x 7½, built in 1874-5; open top; makes spiegeleisen from zinc residuum; annual capacity, 1,800 net tons. *See Northampton Furnace. See Rolling Mills.*

Carbon Iron Works, Carbon Iron Manufacturing Co., Parryville, Carbon county. Three stacks, 52 x 12, 52 x 16, and 65 x 16, built in 1855, 1864 and 1869, respectively; one open and 2 closed tops; total annual capacity, 30,000 net tons. John Brown, President; George Ruddle, Secretary and Treasurer; Dennis Bauman, Manager.

Coleraine Iron Works, Charles F. Shoener, Redington, Northampton

county. Office, 328 Walnut st., Philadelphia. Two stacks, each 60 x 17, built in 1869 and 1872; total annual capacity, 26,000 net tons. Use $\frac{2}{3}$ hematite and $\frac{1}{3}$ magnetic ore. Of the magnetic, $\frac{1}{2}$ is Lake Champlain and $\frac{1}{2}$ New Jersey. Specialty, foundry pig iron. *See Tamaqua Rolling Mill.*

Crane Iron Works, Crane Iron Co., Catasauqua, Lehigh county. Office, 224 South Fourth st., Philadelphia. Six stacks, 45 x 11, 45 x 13, 55 x 17, 55 x 17 $\frac{1}{2}$, 60 x 17 $\frac{1}{2}$, and 60 x 17 $\frac{1}{2}$; built in 1840, 1842, 1846, 1850, 1850, and 1867 respectively; 5 with bell and hopper, and one open top; 5 with iron hot-blast stoves, and one with Whitwell stoves; total annual capacity, 70,000 net tons. Use New Jersey magnetic ore, and brown hematite ore from Lehigh, Berks, and Northampton counties in Pennsylvania. Specialty, stove, foundry and Bessemer pig iron. Brand, "Crane." Geo. A. Wood, President; Geo. T. Barns, Secretary and Treasurer. Officers at the works are: Joshua Hunt, Superintendent; Joseph Hunt, Assistant Superintendent; John Williams, Cashier.

Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks county. Office, 17 Burling Slip, New York. One stack, 76 x 20, built in 1874, and blown in in February, 1876; closed top; annual capacity, 20,000 net tons. Uses $\frac{1}{2}$ hematite ore from Durham, Pa., and $\frac{1}{2}$ magnetic ore from Ringwood, N. J. Specialty, gray forge pig iron. Brand, "Durham." The two old stacks, built in 1848 and 1851, have been demolished. B. F. Fackenthal, Jr., Superintendent.

Emaus Furnace, C. H. Nimson, Allentown. Furnace at Emaus, Lehigh county. One stack, 70 x 16; first put in blast Oct. 10, 1872.

Glendon Iron Works, Glendon Iron Co., Easton, Northampton county. Five stacks, 63 x 16, 50 x 14, 50 x 15, 47 x 15, and 72 x 18; built in 1843, 1844, 1850, 1852, and 1869, respectively. No. 1 was rebuilt in 1849 and 1874. These furnaces are at Glendon, near Easton, except No. 4, which is situated at South Easton. No. 2 and No. 4 are blown by water-power. All closed tops except No. 4. Total annual capacity, 60,000 net tons. Use hematite ore from Northampton county, Pa., and magnetic ore from Morris county, N. J. Specialty, forge pig iron. Brand, "Glendon." President, Augustus Lowell, Boston; Secretary and Treasurer, Thomas T. Bouvé, Boston; Superintendent, Frank Firmstone, Easton.

Keystone Furnace, Henry Fulmer, Easton, Northampton county. Furnace at Glendon, near Easton. One stack, 70 x 16, first blown in April 17, 1876; closed top; annual capacity, 12,000 net tons. Uses magnetic ore from New Jersey and hematite ore from Glendon, Pa. Specialty, foundry pig iron. Brand, "K. F., Glendon, Pa."

Lehigh Iron Co., Allentown, Lehigh county. Two stacks, 55 x 16 and 60 x 17; No. 1 completed July 22, 1869, and No. 2, Oct. 21, 1872; total annual capacity, 21,000 net tons. The ore used is a mixture of $\frac{3}{4}$ Lehigh county hematite and $\frac{1}{4}$ New Jersey magnetic. Specialty, foundry pig iron. Brand, "Lehigh." W. H. Ainey, President, and L. R. Unger, Secretary.

Lehigh Valley Iron Works, Lehigh Valley Iron Co., Coplay, Lehigh county. Three stacks, 60 x 14, 55 x 16, and 55 x 16, built in 1853, 1862, and 1868, respectively; open tops; total annual capacity, 30,000 net tons. Joseph Laubach, President, and B. S. Levan, Secretary and Manager.

Lock Ridge Furnaces, Thomas Iron Co., Alburtis, Lehigh county. Two stacks, each 62 x 15, built in 1867 and 1869; total annual capacity, 25,000 net tons. Use a mixture of native hematite and New Jersey magnetic ores. *See Thomas Iron Works.*

Millerstown Furnace, Millerstown Iron Co., Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in Sept. 14, 1874; annual capacity, 10,500 net tons. James Weiles, President; F. S. Shimer, Treasurer; J. F. M. Shiffert, Secretary; V. W. Weaver, Superintendent.

Northampton Furnace, Bethlehem Iron Co., lessees, Bethlehem. Furnace at Freemansburg, Northampton county. One stack, 64 x 16, built in 1872-3; put in blast July 17, 1873; closed top; annual capacity, 11,200 net tons. Uses local and foreign hematite and magnetic ores. Specialty, Bessemer pig iron. Owned by Northampton Iron Co., of South Bethlehem: John Knecht, President; R. M. Gummere, Secretary; Robert Lockhart, Treasurer. *See Bethlehem Iron Co.*

North Penn Furnace, North Penn Iron Co., Bingen, Northampton county. One stack, 63 x 18, built in 1870. Jacob Hay, President, Easton.

Saucon Furnaces, Saucon Iron Co., Hellertown, Northampton county. Two stacks, 50 x 16, and 60 x 16; put in operation March 25, 1868, and May 25, 1870, respectively; open tops; total annual capacity, 25,000 net tons. Use a mixture of $\frac{3}{4}$ Saucon valley hematite ore and $\frac{1}{4}$ New Jersey magnetic. Specialty, foundry pig iron. Brand, "Saucon." Joseph B. Altemus, President; Jacob Riegel, Treasurer; M. Fackenthall, Secretary and Superintendent.

Thomas Iron Works, Thomas Iron Co., Hokendauqua, Lehigh county. Six stacks: four, 60 x 18, one, 65 x 18, and one, 55 x 18; two were built in 1855, two in 1863, and two in 1873; total annual capacity, 94,000 net tons. Use a mixture of native hematite and New Jersey magnetic ores. Samuel Thomas, President; J. T. Knight, Secretary and Treasurer; John Thomas, General Superintendent. *See Lock Ridge Furnaces.*

Uhler Furnace, Estate of Peter Uhler, Easton, Northampton county.

Furnace at Glendon. One stack, 74 x 15, built in 1872; bell-and-hopper top; annual capacity, 7,500 net tons.

Number of anthracite furnaces in the Lehigh region: 51 stacks.

^{*} SCHUYLKILL VALLEY ANTHRACITE.

Anvil Furnace, Pottstown Iron Co., Pottstown, Montgomery county.

One stack, 60 x 16, built in 1867 and blown in in December, 1867; closed top; annual capacity, 12,000 net tons. Uses magnetic and hematite ore, mined partly at Hopewell, Chester county. Specialty, mill pig iron. *See Rolling Mills.*

Bechtelsville Furnace, Philadelphia and Reading Railroad Co., Bechtelsville, Berks county. Office, 227 South Fourth st., Philadelphia.

One stack, 63 x 16, built in 1875; annual capacity, 11,500 net tons.

East Penn Furnaces, Philadelphia and Reading Railroad Co., Lyons, Berks county. Office, 227 South Fourth st., Philadelphia. Two stacks, each 48 x 12½, built in 1874-5.

Edgehill Furnace, Edgehill Iron Co., Fitzwatertown, Montgomery county.

Office, 43 North Water st., Philadelphia. One stack, 65 x 16, built in 1872. Wm. Stokes, Treasurer.

Henry Clay Furnaces, Eckert & Bro., Reading, Berks county. Two stacks, each 45 x 12; one built in 1842 and blown in in August, 1844; the other built in 1855 and blown in in September, 1856; closed tops; total annual capacity, 16,000 net tons. Use hematite and magnetic ores from Berks and Lebanon counties. Gray forge pig iron is a specialty. Brand, "Henry Clay."

Keystone Furnaces, E. & G. Brooke, Birdsboro, Berks county. Four stacks: one, 30 x 8, built in 1846; formerly called Hampton; originally used charcoal, but changed in 1872 to anthracite. One, 43½ x 12, built in 1853. One, 55 x 15, built in 1871. And the fourth stack, 60 x 16, built in 1873. Use local hematite ore and Cornwall, Warwick, and New Jersey magnetic ores. *See Rolling Mills.*

Keystone Furnaces of Reading, Keystone Furnace Co., Reading, Berks county. Agents for the sale of the iron, Crocker Brothers, 32 Cliff st., New York. Two stacks: one, 50 x 15, built in 1869; the other, 50 x 14, built in 1872-3, blown in during June, 1873; closed tops; total annual capacity, 20,500 net tons. Jacob Bushong, President; H. M. Bushong, Secretary and Treasurer; Jacob K. Spang, Manager.

Kutztown Furnace, Philadelphia and Reading Railroad Co., Kutztown, Berks county. Office, 227 South Fourth st., Philadelphia. One stack, 54 x 15½, built in 1875; first blown in January 21, 1877.

Leesport Furnace, Leesport Iron Co., Leesport, Berks county. One stack, 58 x 15, built in 1852, first blown in in 1853, and rebuilt in 1871;

closed top; annual capacity, 12,000 net tons. Uses $\frac{3}{4}$ hematite ore from Moselem, Berks county, and $\frac{1}{4}$ magnetic ore from Cornwall, Lebanon county. Specialty, foundry pig iron. Brand, "Leesport." President, John G. Kaufman; Vice-President, H. S. Eckert; Secretary, H. H. Muhlenberg; Treasurer and Superintendent, L. M. Kaufman.

Merion Furnaces, J. B. Moorhead & Co., West Conshohocken, Montgomery county. Office, 230 South Third st., Philadelphia. Two stacks: Merion Furnace, 50 x 13, built in 1847 and enlarged in 1876; Elizabeth Furnace, 50 x 16, built in 1872, put in blast October 24, 1872; combined capacity, about 375 net tons per week. Both these furnaces have been idle from April, 1876. Use New York and New Jersey magnetic and local hematite ore. Product, foundry and forge pig iron. Brand, "Merion."

Minersville Furnace, Minersville Coal and Iron Co., Minersville, Schuylkill county. One stack, 55 x 15, built in 1872-3; blown in September 5, 1873; bell-and-hopper top; iron stack; weekly capacity, 200 net tons.

Monocacy Furnace, Monocacy Furnace Co., Monocacy, Berks county. One stack, 50 x 14, built at Hopewell in 1852; moved to Monocacy in 1854; old name, "Theresa;" annual capacity, 10,000 net tons. Specialty, foundry pig iron. Brand, "Monocacy."

Montgomery Furnace, Montgomery Iron Co., Port Kennedy, Montgomery county. Office, 216 South Fourth st., Philadelphia. One stack, 50 x 14, built in 1854, and first blown in in 1856; closed top; annual capacity, 9,000 net tons. Uses magnetic and hematite ores. Specialty, forge pig iron. Brand "Montgomery." President, Morris Patterson; Secretary, Treasurer and Manager, John W. Eckman.

Moselem Furnace, Leibrandt & McDowell, Moselem, Berks county. One stack, 48 x 13, built in 1823, and rebuilt in 1857 and subsequently; closed top; annual capacity, 10,400 net tons. Uses principally hematite ore from Moselem ore mines. Specialty, foundry pig iron. Many improvements were added to this furnace in 1878.

Mt. Laurel Furnace, Clymer Iron Co., Temple, Berks county. One stack, 50 x 11, built in 1836, rebuilt in 1847, and changed to anthracite in 1873; closed top; annual capacity, 5,000 net tons. Wm. H. Clymer, President, and Hiester Clymer, Secretary. *See Charcoal Furnaces.*

Norristown Iron Works, James Hooven & Sons, Norristown, Montgomery county. One stack, 55 x 16, built in 1869; open top; annual capacity, 10,000 net tons. James Hooven, owner. *See Rolling Mills.*

Philadelphia Furnace, S. Robbins & Son, Beach & Vienna sts., Kensington, Philadelphia. One stack, 58 x 14, built in 1873, and blown in December 5, 1873; closed top; annual capacity, 10,000 net tons. Uses

hematite and magnetic ores from Pennsylvania, New York and Delaware. Product, forge and foundry pig iron. *See Rolling Mills.*

Phoenix Iron Works, Phoenix Iron Co., Phoenixville, Chester county. Office, 410 Walnut st., Philadelphia. Three stacks, 48 x 14, 36 x 15, and 50 x 14; two built in 1845, and the third in 1849. *See Rolling Mills.*

Pioneer Furnaces, Atkins Bros., Pottsville, Schuylkill county. Three stacks, 50 x 12, 50 x 13½, and 55 x 15, rebuilt in 1853, and built in 1866 and 1872, respectively; closed tops; total annual capacity, 25,000 net tons. Use magnetic and hematite ore from Lebanon and Berks counties, and from New York. Brand, "Pioneer." Product, Bessemer, forge, and foundry pig iron; specialty, forge iron. *See Rolling Mills.*

Plymouth Furnaces, S. Fulton, Agent, Conshohocken, Montgomery county. Office, 265 South Fourth st., Philadelphia. Two stacks, 55 x 14 and 55 x 13½, built in 1845 and 1861, respectively; closed tops; total annual capacity, 19,000 net tons. Use Pennsylvania hematite and magnetic ore. Specialty, foundry pig iron. Brand, "Plymouth."

Port Carbon Furnace, Philadelphia and Reading Coal and Iron Co., Port Carbon, Schuylkill county. Office, 227 South Fourth st., Philadelphia. One stack, 52 x 15, built in 1872, and put in blast in September, 1872. *See Rolling Mills.*

Reading Iron Works, Reading, Berks county. Office, 261 South Fourth st., Philadelphia. Two stacks, 55 x 15 and 55 x 16, built in 1854 and 1873, respectively; closed tops; total annual capacity, 20,000 net tons. Use hematite ore principally, from Lehigh and Lebanon counties. Product, foundry and mill pig iron. *See Rolling Mills.*

Ringgold Iron and Coal Co., New Ringgold, Schuylkill county. One stack, 52 x 14, built in 1873; blown in February 28, 1874; annual capacity, 7,000 net tons. Edward Silliman, President.

Robesonia Furnaces, Ferguson, White & Co., Robesonia Furnaces P. O., Berks county. Two stacks, 30 x 9 and 50 x 14, built in 1845 and 1858, respectively. Use Cornwall ore exclusively. Make red short pig iron for Bessemer steel and bar iron. Brand, "Robesonia."

Sheridan Furnaces, Wm. M. Kaufman & Co., Sheridan, Lebanon county. Two stacks: one, 52 x 13, built in 1862 to use charcoal, and changed to anthracite in 1867; the other, 55 x 16, built in 1874-5; closed tops; total annual capacity, 18,000 net tons.

St. Clair Furnace, Philadelphia and Reading Railroad Co., St. Clair, Schuylkill county. Office, 227 South Fourth st., Philadelphia. One stack, 55 x 16, built in 1845 by Burd Patterson, but not blown in until 1863 or 1864, when Howell Fisher and Thomas Richards refitted it and blew it in; bell-and-hopper top.

- Swede Furnaces, Philadelphia and Reading Railroad Co., Swedeland, Montgomery county. Office, 227 South Fourth st., Philadelphia. Two stacks, each 60 x 16, built in 1850 and 1853.
- Temple Furnace, Temple Iron Co., Temple, Berks county. One stack, 45 x 13½, built in 1867. Wm. H. Clymer, President.
- Topton Furnace, Topton Iron Co., Topton, Berks county. One stack, 55 x 16, built in 1873. Benjamin Pott, Manager.
- Warwick Furnace, Warwick Iron Co., Pottstown, Montgomery county. One stack, 55 x 16, built in 1875, and first blown in in 1876; closed top; annual capacity, 17,000 net tons. Uses magnetic ore from Boyertown and Seisholtzville, Berks county, and hematite ore from Flourtown, Montgomery county. Specialty, mill pig iron. Brand, "Warwick." Isaac Fegely, President; Jacob Fegely, Jr., Treasurer; Edgar S. Cook, Manager in 1878.
- William Penn Furnaces, D. O. & H. S. Hitner, William Penn P. O., Montgomery county. Three stacks, 35 x 12, 50 x 14, and 40 x 12½, built in 1844, 1845, and 1854.
- Number of anthracite furnaces in the Schuylkill region : 49 stacks.

UPPER SUSQUEHANNA ANTHRACITE.

- Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 48 x 14, built in 1853-4, and blown in April 14, 1854; open top; annual capacity, 9,000 net tons. Uses fossil ore mined in the vicinity. Specialty, gray forge pig iron. Brand, "Bloom."
- Chulasky Furnace, Waterman & Beaver, Chulasky, Northumberland county. Offices, Danville, and 407 Library st., Philadelphia. One stack, 42 x 15, built in 1846. *See Penna. Iron Works. See Rolling Mills.*
- Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks, 39 x 14 and 50 x 14, built in 1840 and 1860, respectively; open tops; total annual capacity, 13,756 net tons. Use native fossil ores. Product, foundry pig iron. Brand, "Columbia."
- Danville Furnaces, John Roach & Son, Danville, Montour county. Office at Morgan Iron Works, foot of Ninth st., New York. Two stacks, 38 x 14 and 60 x 16, built in 1867; total annual capacity, 14,000 net tons.
- Duncannon Furnace, Duncannon Iron Co., Duncannon, Perry county. Office, 122 Race st., Philadelphia. One stack, 45 x 14, built in 1853; open top; annual capacity, 8,000 net tons. Uses Cornwall ore from Lebanon county, fossil ore from Perry county, and mill cinder. Specialty, mill pig iron. Brand, "Duncannon." *See Rolling Mills.*
- Glamorgan Furnaces, Glamorgan Iron Co., Lewistown, Mifflin county. Two stacks, 46 x 12 and 54 x 14½; one built in 1868; one built in 1872, put in blast in December, 1872; total annual capacity, 12,000 net tons;

fuel, anthracite and coke, mixed. Product, principally gray forge pig iron, neutral, inclining to red short. Percival Roberts, President; J. W. Davis, Treasurer; William Willis, Manager. Philadelphia office, 265 South Fourth st.

Irondale Furnaces, Bloomsburg Iron Co., Bloomsburg, Columbia county. Branch office, 122 Race st., Philadelphia. Two stacks, 36 x 12, built in 1844 and 1845; open tops; water-power; total annual capacity, 12,000 net tons. Use native fossil ores entirely. Product, neutral pig iron, slightly inclined to cold short. "A No. 1" foundry is very soft; open grain; used the same as Scotch pig by foundries and machine works, mixed with scrap. No. 1 foundry does not stand quite as much admixture with scrap. No. 2 is used in the manufacture of car wheels. Gray forge has great tensile strength, is sold to mills and forges, and is used for wire, gas pipe, sheet iron, and cotton ties. Charles R. Paxton, President; Wm. E. S. Baker, Treasurer; E. R. Drinker, Manager.

Lackawanna Furnaces, Lackawanna Iron and Coal Co., Edward C. Lynde, Secretary, Scranton, Lackawanna county. Five stacks: two built in 1849, one in 1852, one in 1854, and one in 1872; sizes are 67 x 23, 60 x 16½, 65 x 17½, 70 x 17½, and 70 x 19. Ores used are New Jersey and Lake Champlain magnetic. Product, Bessemer and forge pig iron only. Brand, "Scranton." New York office, 52 Wall st. *See Rolling Mills.*

Lycoming Furnace, D. A. Jones & Co., Minersville, Schuylkill county. Furnace at Ralston, Lycoming county. One stack, 42 x 12½, first put in operation in August, 1874; closed top; annual capacity, 6,000 net tons. Out of blast since 1874.

Mansfield Furnace, Adam Shaaber & Son, Reading, Pa. Furnace at Mansfield, Tioga county. One stack, 36 x 10, built in 1854.

Marshall Furnace, Marshall Bros. & Co., Newport, Perry county. Philadelphia office, 24 Girard avenue. One stack, 50 x 14, built in 1872, and blown in in July, 1872; closed top; annual capacity, 7,000 net tons. Fuel, half coke and half anthracite coal. Ores, magnetic, fossil, and hematite, from York, Cumberland, Perry and Juniata counties. Specialty, pig iron for foundry use and for sheet iron blooms. Brand, "Marshall." P. Hiestand, Superintendent. *See Rolling Mills.*

Matilda Furnace, Estate of B. B. Thomas, Mount Union, Huntingdon county. Office, 256 S. Third st., Philadelphia. One stack, 42½ x 10, built in 1837; annual capacity, 3,500 net tons. Uses fossil ores and Juniata valley hematite. Product known as "Matilda" pig iron. Charles E. Sackett, Superintendent.

Northumberland Furnace, James S. Marsh & Co., Northumberland, Northumberland county. One stack, 61 x 18, built in 1873-4; has never been in blast.

Pennsylvania Iron Works, Waterman & Beaver, Danville, Montour county. Office, 407 Library st., Philadelphia. Three stacks: two 50 x 16, and one 34 x 14, built in 1842. *See Chulasky Furnace. See Rolling Mills.* Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; annual capacity, 7,000 net tons. Uses fossil ores. Product, principally foundry pig iron. Dr. L. Rooke, Manager.

Number of anthracite furnaces in the Upper Susquehanna region: 25 stacks.

LOWER SUSQUEHANNA ANTHRACITE.

Aurora Furnace, Wrightsville Iron Co., Wrightsville, York county. One stack, 38 x 14, built in 1867. Wm. McConkey, President. Out of blast for several years.

Cameron Furnace, Cameron Furnace Co., Middletown, Dauphin county. One stack, 48 x 13½, built in 1857; 3 tuyeres; closed top; bell and hopper. Uses York and Cumberland hematite. Product, principally forge pig iron. Brand, "Cameron." James Young, President, and J. H. Landis, Treasurer.

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Co., Columbia, Lancaster county. Three stacks: one, 34 x 11, and, two, 46 x 16, built in 1845, 1854, and 1868; open tops; total annual capacity, 18,000 net tons. Use hematite ore from Lancaster county, Pa., and Carroll county, Md. Specialty, foundry pig iron. Brand, "Chestnut Hill." Moses Taylor, President and Treasurer; P. R. Pyne, Secretary; Charles J. Nourse, Manager.

Chickies Furnaces, Chickies Iron Co., (successor to E. Haldeman & Co.,) Chickies, Lancaster county. Two stacks: No. 1, 45 x 11, built in 1845; No. 2, 45 x 13, built in 1854; open tops; total annual capacity, 12,100 net tons. Use magnetic ore from Cornwall, Lebanon county, and Chestnut Hill brown hematite from Silver Spring, Lancaster county. Product, foundry and mill pig iron. Brand, "Chickies." President, Paris Haldeman; Secretary and Treasurer, Horace L. Haldeman.

Coleman's (R. W.) Heirs & Co., Cornwall, Lebanon county. Five stacks: Bird Coleman Furnace, 52 x 15, built in 1872-3. Cornwall Anthracite Furnaces, two stacks, each 38 x 12, built in 1850 and 1854. Donaghmore Furnace, 44 x 14, built in 1855. North Cornwall Furnace, 52 x 15, built in 1873-4 by Mrs. M. C. Freeman. Use Cornwall ore exclusively. A. Wilhelm, Attorney. *See Charcoal Furnaces.*

Conestoga Furnace, Thomas & Peacock, Lancaster, Lancaster county. Office, 256 South Third st., Philadelphia. One stack, 38 x 10, built in 1846; annual capacity, 6,000 net tons.

- Dauphin Furnace, Dr. Lewis Heck, Dauphin, Dauphin county. One stack, 40 x 11, built in 1854, and rebuilt in 1872, and changed to anthracite; open top; annual capacity, 5,000 net tons. Uses Cumberland county neutral hematite ore. Product, foundry and forge pig iron. Offered for sale or lease on reasonable terms.
- Dock Iron Works, Gilliard Dock & Co., Harrisburg, Dauphin county. One stack, 40 x 11, built in 1873-4; closed top; annual capacity, 5,000 net tons. Has not yet been in blast.
- Donegal Furnace, Benson & Cottrell, Columbia, Lancaster county. Furnace at Marietta. One stack, 36 x 12, built in 1848; open top; annual capacity, 6,500 net tons.
- Harrisburg Furnace, A. Price's Heirs, Pittston. Furnace at Harrisburg, Dauphin county. One stack, 39 x 12, built in 1844; formerly Porter Furnace; open top; annual capacity, 6,000 net tons. Out of blast since 1874.
- Kauffman Furnace, H. M. North, Columbia, Lancaster county. One stack, 36 x 14, built in 1848; open top; annual capacity, 6,500 net tons. Uses hematite ore from York county. Held for sale.
- Lebanon Furnaces, G. Dawson Coleman, Lebanon, Lebanon county. Two stacks: one 50 x 14, built in 1846, reconstructed in 1868; the other, built in 1872-3, put in blast in August, 1873. A third stack, 36 x 12, built in 1847, has recently been torn down for the purpose of rebuilding, but work on it has been discontinued. The combined capacity of the two furnaces in operation is about 400 net tons a week. Use Cornwall ore.
- Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 38 x 12, built in 1867; blown in December 23, 1867; open top; annual capacity, 6,000 net tons. Uses Cornwall ore. Specialty, gray forge red-short pig iron. Brand, "Lebanon Valley."
- Lochiel Furnace, Lochiel Rolling Mill Co., Harrisburg, Dauphin county. One stack, 52 x 14, built in 1873; put in blast in April, 1873; closed top; annual capacity, 7,500 net tons. *See Rolling Mills.*
- Marietta Furnace No. 1, Ethelbert Watts, Marietta, Lancaster county. One stack, 47 x 12, built in 1847; annual capacity, 5,000 net tons.
- Marietta Furnace No. 2, William M. Watts, Marietta, Lancaster county. One stack, 45 x 12, built in 1850.
- Middletown Furnace, Lyman Nutting, Middletown, Dauphin county. Office at Lebanon. One stack, 40 x 12½, built in 1853.
- Musselman Furnace, H. Musselman & Son, Marietta, Lancaster county. One stack, 41 x 14, built in 1868; open top; annual capacity, 6,000 net tons. A. H. Musselman, Manager.
- Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two

stacks, 50 x 14 and 60 x 14, built in 1855 and 1872; combined weekly capacity, 400 net tons.

Pennsylvania Steel Co., Steel Works P. O., Dauphin county. Office, 208 South Fourth st., Philadelphia. Two stacks: No. 1, 60 x 14, built in 1872-3; put in blast in October, 1873. No. 2, 75 x 20, built in 1874-6; put in blast in June, 1876; remodeled in 1877 and supplied with 3 Whitwell stoves. Fuel, coke and anthracite coal mixed. Total annual capacity, 30,000 net tons. Use foreign and domestic ores of various kinds. Specialty, Bessemer pig iron. *See Rolling Mills.*

Richmond Furnace, Southern Pennsylvania Railway and Mining Co., Richmond Furnace, Franklin county. One stack, 36 x 9½, built in 1865; open top; annual capacity, 3,000 net tons. Formerly called Mt. Pleasant Iron Works. Thos. B. Kennedy, President; John L. Ritchey, Secretary and Treasurer; James A. Reside, Manager.

Safe Harbor Furnace, Phoenix Iron Co., Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. One stack, 45 x 14, built in 1848; annual capacity, 8,000 net tons. Not in blast since 1865. *See Rolling Mills.*

Stanhope Furnace, Wynkoop Bros., Pine Grove, Schuylkill county. One stack, 33 x 10, built in 1825; closed top; bell and hopper; annual capacity, 5,200 net tons. E. W. Wynkoop, Manager. Out of blast since June, 1874.

St. Charles Furnaces, C. B. Grubb & Son, Lancaster, Lancaster county. Works at Columbia. Two stacks: one, 42 x 14, built in 1853; the other, formerly the Henry Clay, 39 x 11, built in 1845. Use 40 per cent. Cornwall ore, and the remainder local Chestnut Hill ore. Product, pig iron which is well known as exceptional for its quality for boiler plate, bars, nails, or foundry work. Brand, "Grubb."

Union Deposit Furnace, McCormick Estate, Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 39½ x 11, built in 1854; open top; annual capacity, 5,000 net tons.

Wister Furnace, J. & J. Wister, Harrisburg, Dauphin county. One stack, 45 x 14, built in 1867, and first blown in February 15, 1868; closed top; bell and hopper; annual capacity, 9,000 net tons. Uses ⅓ hematite and remainder magnetic ore; the former from Seisholtzville, Berks county, and the latter from Cornwall, Lebanon county. Specialty, mill pig iron. Brand, "Wister." Manager, Jones Wister.

Number of anthracite furnaces in the Lower Susquehanna region: 37 stacks.

SHENANGO VALLEY.—BITUMINOUS COAL OR COKE.

Allen Furnace, Henderson, Allen & Co., Sharpsville, Mercer county. One stack, 50 x 12, built in 1868; put in operation in October, 1868;

annual capacity, 10,000 net tons. Ore used is Lake Superior specular. Product, red-short pig iron, No. 1 mill, soft, open, gray, and very strong.

Clara Furnace, Crowther Iron Co., New Castle, Lawrence county. One stack, 60 x 15½, built in 1872; put in blast in May, 1872; closed top; annual capacity, 20,000 net tons. Used Lake Superior ores in 1877, from the Barnum, Lake Superior, and Michigamme mines. Fuel, coke. Product, Bessemer pig iron. George B. Berger, Manager.

Douglas Furnaces, Pierce, Kelly & Co., Sharpsville, Mercer county. Two stacks: one stack, 50 x 12, built in 1871; one stack, 50 x 14, built in 1872; fuel, ¾ raw coal and ¼ coke; combined annual capacity, 20,000 net tons. Use Lake Superior ores. Product, foundry and forge pig iron. Jonas J. Pierce, General Manager.

Etna Furnaces, Etna Iron Works Limited, New Castle, Lawrence county. Two stacks, each 50 x 12, built in 1868; fuel, raw coal and coke; combined annual capacity, 30,000 net tons. *See Rolling Mills.*

Fannie Furnace, Wheeler Iron Co., Sharon. Works at West Middlesex, Mercer county. One stack, 51½ x 13½, built in 1873; put in blast October 13, 1873; fuel, raw coal and coke; annual capacity, 14,000 net tons. Uses Republic and Palmer ores from Lake Superior. Product, principally Bessemer pig iron. Brand, "Fannie." E. A. Wheeler, President. *See Rolling Mills.*

Keel Ridge Furnace, Kimberly, Carnes & Co., Sharon, Mercer county. One stack, 55 x 13¾, built in 1869; fuel, raw coal and coke; annual capacity, 12,000 net tons. *See Rolling Mills.*

Mt. Hickory Iron Co., Sharpsville, Mercer county. Two stacks, each 50 x 12, built in 1869; combined annual capacity, 18,000 net tons. Use Lake Superior ore. Product, foundry and forge pig iron. Jonas J. Pierce, General Manager.

Neshannock Furnace, Neshannock Iron Co., New Castle, Lawrence county. One stack, 60 x 16, built in 1872; first put in operation December 1, 1872; closed top; coke; annual capacity, 24,000 net tons. Uses Lake Superior ore. Product, Bessemer pig iron. W. E. Reis, Manager.

Ormsby Furnace, Sharon Banking Co., Sharon. Furnace at Sharpsville, Mercer county. One stack, 50 x 12, built in 1872; blown in in February, 1873; open top; annual capacity, 9,000 net tons. Idle since 1876.

Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer county. One stack, 46 x 10½, built in 1845; annual capacity, 9,000 net tons. Out of blast since 1874.

Sharpsville Furnace, Sharpsville Iron Co., Sharpsville, Mercer county. One stack, 50 x 11, built in 1847; annual capacity 9,000 net tons. Uses

Lake Superior ore. Product, foundry and forge pig iron. Jonas J. Pierce, General Manager.

Shenango Furnaces, Shenango Furnace Co., West Middlesex, Mercer county. Two stacks, each 46 x 10, built in 1859; open tops; fuel, raw coal; combined annual capacity, 17,000 net tons. S. Perkins, Jr., Manager.

Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence county. Three stacks, Sophia, Little Pet, and Rosena: the two first, 65 x 16, and 40 x 9, built in 1872 and 1853, respectively; the third, 77 x 20, completed in 1872, put in blast in June, 1873; fuel, coke; combined annual capacity, 40,000 net tons. *See Rolling Mills.*

Spearman Furnaces, Spearman Iron Co., Sharpsville, Mercer county. Two stacks, each 50 x 14, built in 1872; blown in Jan. 15, 1873, and Sept. 20, 1875; closed tops; fuel, raw coal and coke; combined annual capacity, 36,000 net tons. Use Lake Superior ore. Product, Bessemer, foundry, and red-short mill pig iron. Brand, "Spearman." J. J. Spearman, Manager.

Stewart Furnaces, Stewart Iron Co. Limited, Sharon, Mercer county. Formerly Valley Furnaces. Two stacks: one, 50 x 13, built in 1870, and one, 55 x 14, built in 1872; closed tops; combined annual capacity, 33,000 net tons. Ore used is Jackson, Lake Superior, specular. Product, strictly Bessemer pig iron. *See Rolling Mills.*

Wampum Furnace, Wampum Furnace Co., Wampum, Lawrence county. One stack, 50 x 13, built in 1856; open top; bituminous coal and coke; annual capacity, 8,000 net tons. Ores used are Lake Superior and native red limestone. Product, neutral forge pig-iron. Edward Kay, Manager.

Westerman Furnaces, Westerman Iron Co., Sharon, Mercer county. Two stacks, each 50 x 13, built in 1865 and 1866; one open and one closed top; fuel, raw coal and Connellsville coke; combined annual capacity, 18,000 net tons. Use Lake Superior ore. Specialty, No. 1 mill pig iron. Brand, "Westerman." *See Rolling Mills.*

Wheatland Furnaces, B. B. Reath, 1538 Pine st., Philadelphia. Works at Wheatland, Mercer county. Four stacks, built from 1860 to 1865; one, 46 x 9, and three, 46 x 12; combined annual capacity, 30,000 net tons. Out of blast since September, 1875. *See Rolling Mills.*

Number of raw coal and coke furnaces in the Shenango region: 30 stacks. The Vinton Iron Co., J. J. Vinton, President, run a small cupola at Sharon, Mercer county, which remelts slag and turns out a small quantity of mill pig iron.

ALLEGHENY COUNTY.—COKE.

Clinton Furnace, Graff, Bennett & Co., Pittsburgh. One stack, 45 x 12,

built in 1859; ore, principally Lake Superior, and remainder from Missouri; annual product, 12,000 net tons. *See Rolling Mills.*

Eliza Furnaces, Laughlin & Co., Pittsburgh. Two stacks, built in 1861; originally, 45 x 12, but in 1873 and 1874 they were enlarged, and No. 1 is now 60 x 17, while No. 2 is 60 x 14; fuel, coke; ores, Lake Superior almost exclusively; specialty, mill pig iron; brand, "Eliza;" total annual capacity, 40,000 net tons.

Isabella Furnaces, Isabella Furnace Co., Etna. Two stacks, 75 x 18 and 75 x 20, built in 1872; closed tops; total annual capacity, 75,712 net tons. Use Lake Superior ores. Product, foundry and mill pig iron. Benjamin Crowther, Manager.

Lucy Furnace, Lucy Furnace Co., (Carnegie Brothers & Co., owners,) Pittsburgh. Two stacks, each 75 x 20; No. 1 first put in blast in May, 1872; No. 2 first put in blast September 27, 1877; closed tops; 4 iron pipe stoves to each stack; aggregate annual capacity, about 82,000 net tons. Fuel, $\frac{1}{2}$ coke from washed slack and $\frac{1}{2}$ Connellsville coke. Ores are almost exclusively from Lake Superior. Specialty, Bessemer pig iron. Thomas M. Carnegie, President; Henry Phipps, Jr., Secretary and Treasurer; Henry M. Curry, Manager.

Shoenberger Furnaces, Shoenberger, Blair & Co., Pittsburgh. Two stacks, 62 x 13 $\frac{3}{4}$, built in 1865; closed tops; fuel, coke; total annual capacity, 45,000 net tons. Use Lake Superior ores, and produce gray forge pig iron.

Soho Furnace, Moorhead, McCleane & Co., Pittsburgh. One stack, 67 x 18 $\frac{3}{4}$, built in 1872; put in blast November 22, 1872; fuel, coke; annual capacity, 25,000 net tons. Uses Lake Superior ores. Specialty, Bessemer pig iron. Brand, "Soho." Manager, A. C. Kroman.

Superior Furnaces, Pittsburgh. Two stacks, 45 x 12, built in 1862-3; total annual capacity, 22,000 net tons. Out of blast since 1874. In hands of trustees for bondholders: Alexander Nimick of Pittsburgh and John M. Kennedy of Philadelphia. *See Rolling Mills.*

Number of coke furnaces in Allegheny county: 12 stacks.

RAW BITUMINOUS COAL OR COKE.—STATE.

Allegheny Furnace, S. C. Baker, Altoona, Blair county. One stack, 32 x 9, built in 1811; fuel, coke.

Blair Iron and Coal Co., Hollidaysburg, Blair county. General office, 218 South Fourth st., Philadelphia. Four stacks: Bennington Furnace, at Bennington, Blair county, 40 x 9 $\frac{1}{2}$, built in 1856; No. 1 and No. 2, at Hollidaysburg, 45 x 12 and 51 $\frac{1}{2}$ x 10 $\frac{1}{2}$, respectively, built in 1856; and Frankstown Furnace, at Frankstown, Blair county, 45 x 10, built in 1836, rebuilt in 1872, and put in blast November 1, 1872. All use coke; closed tops; combined annual capacity, 26,000 net tons.

The Bennington and Hollidaysburg furnaces make Bessemer pig iron, and Frankstown makes foundry and mill pig iron. Use Pennsylvania hematite ore from Springfield and Bloomfield, and Lake Superior ore. President, Dr. Charles Stewart Wurts, Philadelphia; Secretary and Treasurer, W. S. Robinson, Philadelphia; Manager, W. R. Babcock, Hollidaysburg.

Brady's Bend Furnaces, F. W. Rhoades, Agent for trustees of Brady's Bend Iron Co., Brady's Bend, Armstrong county. Four stacks, 44 x 9, 44 x 10½, 50 x 14, and 50 x 13½, built from 1842 to 1845; coke; 2 open tops, and 2 closed; total annual capacity, 20,000 net tons. Not in blast since 1874 for the manufacture of pig iron, but in 1878 one of the furnaces was fitted up and put in blast by J. C. Bennett for the purpose of testing his method of manufacturing malleable or wrought iron in one process direct from the ore. *See Rolling Mills.*

Cambria Iron Works, Cambria Iron Co., Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Six stacks; fuel, coke. Five of these stacks are at Johnstown, and one is at East Conemaugh, two miles from Johnstown. Of the stacks at Johnstown, four were built in 1853 and 1854, being respectively 70 x 15, 48 x 13½, 68½ x 13½, and 68½ x 13½; the fifth, called "Centennial Furnace," was built in 1872-6, was blown in Dec. 22, 1876, and is 78 x 19½. The stack at East Conemaugh is 50 x 11½, was built in 1857, and is now making spiegeleisen from a mixture of foreign and domestic ores. Total annual capacity, 102,000 net tons. The furnaces of the Blair Iron and Coal Co., which are practically under the same management, add 26,000 net tons to this capacity, making the total 128,000 net tons. Ores used are brown hematite, from Blair county, Pa.; specular, magnetic and hematite from Lake Superior; Spanish ores, New Jersey magnetic, and other ores. Specialty, Bessemer pig iron. *See Rolling Mills.*

Charlotte Furnace Co., Everson, Macrum & Co., Scottdale, Westmoreland county. One stack, 65 x 16, built in 1872-3; put in blast October 14, 1873; coke; uses ½ Lake Superior ores and ¾ native; specialty, mill pig iron; brand, "Charlotte;" annual capacity, 13,000 net tons. *See Rolling Mills.*

Dunbar Furnace, Dunbar Furnace Co., Dunbar, Fayette county. One stack, 77 x 20, built in 1790, rebuilt in 1870, and rebuilt to present size in 1876; 4 Whitwell hot-blast stoves, each 40 x 18; new furnace blown in March 1, 1877. Uses Connellsville coke and a mixture of ½ calcined carbonate ore mined on the property, ¾ Lake Superior or Cornwall ore, and ½ mill cinder. Specialty, mill pig iron. Old stack was called "Union." President, Charles Parrish; Superintendent and Vice-President, Arthur B. DeSaulles; Treasurer, Fisher Hazard.

Elizabeth Furnace, Martin Bell & Co., Sabbath Rest, Blair county.
One stack, 32 x 9, built in 1832, and, after a long rest, put in blast in the fall of 1872; coke.

Fairchance Furnace, Fairchance Iron Co., Uniontown, Fayette county.
One stack, 44 x 12, built in 1784, and rebuilt in 1871; coke. Ores are native carbonates, varying from 30 to 50 per cent. E. Livingston, President, 22 Nassau st., New York; Richard Irvin, Jr., Secretary and Treasurer, 22 William st., New York; R. L. Martin, Superintendent, Uniontown, Pa.

Gap Furnace, Hollidaysburg and Gap Iron Co., McKee, Blair county.
One stack, 46½ x 10, built in 1840, and remodeled in 1877; coke; closed top; annual capacity, 5,000 net tons. *See Rolling Mills.*

Howard Furnace, Lauth, Thomas & Co., Howard, Centre county. Philadelphia office, 256 South Third st. One stack, 33 x 8, built in 1830; annual capacity, 5,000 net tons. Rebuilt to use coke in 1872, but not blown in since. *See Charcoal Furnaces. See Rolling Mills.*

Kemble Furnaces, Kemble Coal and Iron Co., Riddlesburg, Bedford county. William Lauder, General Superintendent, Riddlesburg. General office, 20 Nassau st., New York; address P. O. Box 157. Two stacks, 60 x 14, built in 1869 and 1870; the first was put in blast July 4, 1869, and the second, March 4, 1871; closed tops; total annual capacity, 18,000 net tons. Coke, from washed coal. Use local fossil ores. Product, principally forge pig iron. Brand, "Kemble." President, Robert Kelly, New York; Secretary and Treasurer, R. A. Wight, New York.

Lemont Furnace, Ewing, Hanna & Co., Uniontown, Fayette county.
One stack, 65 x 15, built in 1875; put in blast in January, 1876; uses Connellsville coke and native ores, all obtained on the furnace land; annual capacity, 14,000 net tons. Product, forge and foundry pig iron. Brand, "Lemont."

Mahoning Furnace, John A. Colwell & Co., Oakland, Armstrong county.
One stack, 40 x 10½, built in 1845; closed top; coke; annual capacity, 3,900 net tons.

Oliphant Furnace, F. H. Oliphant, Uniontown. One stack, 50 x 11, built in 1875-6; coke.

Pine Creek Furnace, Brown & Mosgrove, Kittanning, Armstrong county.
One stack, 47 x 11, built in 1846; open top; coke; annual capacity, 3,800 net tons. Uses native limestone ore. Product, No. 1 chilled forge or mill pig iron. John P. Painter, Manager.

Rebecca Furnace, Mrs. Elizabeth Lytle, Martinsburg, Blair county.
One stack, 30 x 8½, built in 1820. Out of blast in 1877 and 1878.

Red Bank Furnace, Reynolds & Moorhead, Red Bank Furnace, Clarion

county. One stack, 42 x 11, built in 1859; coke; closed top; annual capacity, 5,000 net tons. Uses limestone ore, mined on the furnace land. Specialty, mill pig iron, cold-short. David Reynolds, Manager.

Rockhill Furnaces, Rockhill Iron and Coal Co., Orbisonia, Huntingdon county. Office, 320 Walnut st., Philadelphia. Two stacks, 65 x 17½ and 65 x 17, built in 1875, and blown in January 1, 1876; fuel, coke; closed tops; total annual capacity, 20,000 net tons. Use fossil and hematite ore, mined in the vicinity. Specialty, gray forge pig iron. Brand, "Rockhill." Wm. A. Ingham, President; Edward Roberts, Jr., Vice-President; Wm. Boyd Jacobs, Secretary and Treasurer; A. W. Sims, Manager.

Rodman Furnaces, Duncan's Heirs, Roaring Springs, Blair county. Two stacks, 42 x 9 and 45 x 14, built in 1846; coke; total annual capacity, 10,500 net tons.

Stewardson Furnace, F. B. & A. Laughlin, Pittsburgh. Furnace at Mahoning, Armstrong county. One stack, 43½ x 11, built in 1851; coke; open top; annual capacity, 4,000 net tons. Makes cold-short pig iron.

Number of raw coal or coke furnaces in Pennsylvania, outside of Allegheny county and the Shenango region: 34 stacks.

CHARCOAL.—STATE.

Barree Furnace, Lowry, Eichelberger & Sons, lessees, Barree Forge, Huntingdon county. Heberton & Co., Agents, 333 Walnut st., Philadelphia. One stack, 33 x 9, built in 1863; hot blast; open top; water-power; annual capacity, 2,000 net tons. *See Hopewell Furnace. See Bloomaries.*

Big Pond Furnace, Philadelphia and Reading Coal and Iron Co., Newville, Cumberland county. Office, 227 South Fourth st., Philadelphia. One stack, 33 x 8½, built in 1836.

Carlisle Iron Works, C. W. Ahl & Son, Boiling Springs, Cumberland county. Office at Carlisle. One stack, 28 x 8½, built in 1798 and rebuilt in 1815; hot blast; closed top; water-power; annual capacity, 1,600 net tons. Uses hematite ore, mined in the vicinity. Specialty, forge pig iron. Brand, "Carlisle." *See Bloomaries.*

Carrick Furnace, R. M. Shalter, Carrick Furnace, Franklin county. One stack, 30 x 8, built in 1828; annual capacity, 1,800 net tons.

Chestnut Grove Furnace, Jesse R. Group, Idaville, Adams county. One stack, 33 x 8½, built in 1830; cold blast; closed top; annual capacity, 1,000 net tons.

Cornwall Furnace, R. W. Coleman's Heirs & Co., Cornwall, Lebanon county. One stack, 31 x 8, built in 1742. A. Wilhelm, Attorney. *See Lower Susquehanna Furnaces.*

- Eagle Furnace, Curtins & Co., Roland, Centre county. One stack, 28 x 7½, built in 1848; open top, open hearth, and closed tuyere; cold blast; water-power; annual capacity, 1,800 net tons. *See Rolling Mills. See Bloomaries.*
- East Penn Furnace, John Balliet, Parryville, Carbon county. One stack, 28 x 7½, built in 1837; cold blast; water-power.
- Emma and Greenwood Furnaces, Logan Iron and Steel Co., Greenwood, Huntingdon county. Office, Lewistown, Mifflin county. Philadelphia office, 218 South Fourth st. Three stacks: Emma Furnace has one stack, 34 x 9, built in 1867; warm and cold blast; brown hematite and red fossiliferous ore; pig iron used for bar iron, car-wheels, and chilled rolls. Greenwood Furnaces have two stacks, 30 x 8½ and 32 x 8½, built in 1833 and 1864; cold blast; red fossiliferous ore; pig iron used for car-wheels and chilled rolls. *See Rolling Mills.*
- Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, 55 x 9½, built in 1869; hot blast; annual capacity, 8,000 net tons. Run on soft coal for several years; now charcoal.
- Forest Iron Works, A. Pardee, White Deer Mills, Union county. Office, 303 Walnut st., Philadelphia. One stack, 35 x 9, built in 1846.
- Franklin Furnace, Hunter & Springer, St. Thomas, Franklin county. One stack, 32 x 7½, built in 1828; cold blast; annual capacity, 1,500 net tons. Uses Cumberland Valley brown hematite ore. Product, car-wheel pig iron. Brand, "Franklin."
- Hecla Furnace, McCoy & Linn, Milesburg, Centre county. One stack, 32 x 8½, built in 1864; cold blast; water-power; open top; annual capacity, 2,000 net tons. Uses hematite ore from Nittany valley. Specialty, forge pig iron. Entire product used in forge and rolling mill of the firm. Old Hecla Furnace, built in 1820, was abandoned in 1864. *See Rolling Mills. See Bloomaries.*
- Hope Furnace, Joseph S. Brown & Co., Rose Point, Lawrence county. One stack, 28 x 8, built in 1868; cold blast. The ore and limestone are mined only 200 yards from the furnace. Entire make is used by Brown & Co.'s Wayne Iron and Steel Works at Pittsburgh in the manufacture of steel and plate-iron.
- Hopewell Furnace, Buckley & Clingan, Warwick, Chester county. Furnace in Berks county. One stack, 30 x 7, built in 1759; cold blast; water-power; ores used are principally magnetic ores, obtained in the neighborhood.
- Hopewell Furnace, Lowry, Eichelberger & Sons, Hopewell, Bedford county. Heberton & Co., agents, 333 Walnut st., Philadelphia. One stack, 30 x 8½, built in 1800; warm blast; open top; water-power; annual capacity, 1,600 net tons. *See Barree Furnace. See Bloomaries.*

- Howard Furnace, Lauth, Thomas & Co., Howard, Centre county. Philadelphia office, 256 South Third st. One stack, 31 x 8½, built in 1833; cold blast; water-power. *See Bituminous Furnaces. See Rolling Mills.*
- Isabella Furnace, Smith & Bros., Barneston, Chester county. One stack, 33 x 8, built in 1835 and rebuilt in 1864; cold blast; water-power. Product, neutral pig iron, made from magnetic and hematite ores.
- Jefferson Furnace, John M. Kaufman & Bros., Auburn, Schuylkill county. One stack, 31 x 7, built in 1864; cold blast; water-power.
- Joanna Furnace, L. Heber Smith, Joanna Furnace, Berks county. One stack, 30 x 8, built in 1792, and rebuilt in 1847; cold blast; water and steam power; open top; annual capacity, 1,200 net tons. Uses magnetic and hematite ores from the vicinity. Specialty, car-wheel pig iron. Brand, "Joanna."
- Laura Furnace, Perry Creamer, assignee of W. A. Taylor & Co., Millers-town, Perry county. One stack, 35 x 9, built in 1873; cold blast; water-power; weekly capacity, 35 net tons.
- Logan Furnace, Valentines & Co., Bellefonte, Centre county. One stack, 32 x 8, built in 1815; cold blast; water-power; open top; annual capacity, 3,000 net tons. *See Rolling Mills. See Bloomaries.*
- Madison Furnace, Wetter & Lyon, Sligo, Clarion county. One stack, 32 x 9, built in 1836; cold blast. Out of blast since 1874.
- Maiden Creek Furnace, Spang, Hunsicker & Erb, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold and warm blast; water and steam power; open top; annual capacity, 1,600 net tons.
- Mont Alto Furnace, Mont Alto Iron Co., Mont Alto, Franklin county. One stack, 37½ x 9½, built in 1808; cold and warm blast; open top; annual capacity, 5,600 net tons. Uses exclusively neutral brown hematite ore from the furnace property, which consists of 20,000 acres of land. The pig iron is used for car-wheels and blooms. Brand, "Mont Alto." I. S. Waterman, President, 407 Library st., Philadelphia, and George B. Wiestling, Superintendent, Mont Alto. *See Bloomaries.*
- Mount Etna Furnace, Samuel Isett, Yellow Springs, Blair county. One stack, 31 x 8, built in 1808; cold blast; brown hematite ore; pig iron made into blooms for boiler-plate and steel. *See Bloomaries.*
- Mount Hope Furnace, A. Bates Grubb, Mount Hope, Lancaster county. One stack, 44 x 9, built in 1784; hot blast; closed top; annual capacity, 3,000 net tons. Uses Cornwall ore. Specialty, car-wheel pig iron.
- Oley Furnace, Clymer Iron Co., Temple, Berks county. One stack, 30 x 8, built in 1772; cold blast; water-power; annual capacity, 1,200 net tons. Wm. H. Clymer, President, and Hiester Clymer, Secretary. *See Schuylkill Valley Furnaces.*
- Pennsylvania Furnace, Lyon, Shorb & Co., Graysville, Huntingdon

county. One stack, 43 x 9½, built in 1813; pig iron made into blooms for boiler plate and sheet iron. Geo. W. Lyon, Manager. *See Bloomaries.*

Pine Grove Furnace, South Mountain Mining and Iron Co., Pine Grove Furnace, Cumberland county. One stack, 45 x 9½, built in 1770, remodeled in 1877; hot blast; bell-and-hopper top; annual capacity, 6,000 net tons. Ores are hematite, procured on the furnace property, which comprises 27,000 acres of land. Pig iron is used for blooms. J. C. Fuller, President; W. H. Woodward, Secretary and Treasurer; S. C. Miller, Superintendent. *See Bloomaries.*

Sarah Furnace, G. W. Smith, (of Hostetter & Smith.) Pittsburgh. Furnace at Sarah, Blair county. One stack, 32½ x 8½, built in 1824; cold blast; open top; annual capacity, 1,500 net tons. *See Bloomaries.*

Springfield Furnace, John Royer, Royer P. O., Blair county. One stack, 31 x 8½, built in 1814 and blown in in 1815; warm blast; water-power; open top; annual capacity, 2,000 net tons. Uses brown hematite ore, mined near the furnace. Specialty, gun iron. This furnace has only stopped for repairs since it was first blown in. A. McAllister, Manager. *See Bloomaries.*

Washington Iron Works, Lamar, Clinton county. Tatlow Jackson, Agent, 520 Walnut st., Philadelphia. One stack, 30 x 7, built in 1809. *See Bloomaries.*

Windsor Furnace, Daniel B. Fisher, Leesport, Berks county. One stack, 28 x 8½, built about 1830; cold blast; open top; water-power; annual capacity, 1,000 net tons. Blown in Sept. 13, 1877, after a long rest.

York Furnace, John Bair, York Furnace, York county. One stack, 32 x 8, built in 1830; cold blast; water-power.

Number of charcoal furnaces: 37 stacks. Total number of furnaces in Pennsylvania: 275 stacks.

MARYLAND.

CHARCOAL.

Catoctin Furnaces, J. B. Kunkel, Catoctin Furnaces, Frederick county. Two stacks, 32 x 8½ and 32 x 9, built in 1775 and 1856; open tops; warm and cold blast; steam and water-power; total annual capacity, 5,000 net tons. *See Coke Furnaces.*

Cedar Point Furnace, Baltimore Iron Co., Baltimore, Baltimore county. One stack, 40 x 9½, built in 1843; hot blast; closed top; annual capacity, 4,500 net tons. Product, car-wheel and malleable pig iron. President, Edward Brooke, Birdsboro, Pa.; Secretary, G. W. P. Coates, and Treasurer, Horace L. Brooke, Baltimore. *See Anthracite Furnaces.*

- Chesapeake Furnaces, Wm. F. Pannell, 23 and 25 South Frederick st., Baltimore. Two stacks, 32 x 8, built in 1845 and 1853; warm blast; total annual capacity, 5,500 net tons. Use white hone ore and brown ore, raised within three miles of Baltimore, yielding about 40 per cent. of iron.
- Green Spring Furnace, J. B. Haines & Co., Green Spring Furnace, Washington county. One stack, 35 x 8½, built in 1848; warm blast; water-power; open top; annual capacity, 1,200 net tons. Works for sale.
- Harford Furnace, Clement Dietrich & Sons, Harford Furnace, Harford county. One stack, 28 x 6½, built in 1828; hot blast; steam and water power.
- Laurel Furnace, D. M. Reese & Sons, Baltimore. One stack, 52 x 10, built in 1856, and rebuilt in 1873; warm blast; closed top; annual capacity, 4,500 net tons. Uses brown and white hematite ore, obtained between Baltimore and Washington, yielding 35 per cent. of iron. Product, pig iron for car-wheels, steel, and malleable purposes, known as "Laurel wheel iron."
- La Grange Furnace, E. S. Rogers, Clermont Mills, Harford county. One stack, 32 x 7½, built in 1836; warm blast; water-power.
- Locust Grove Furnace, Heirs of Robert Howard, Rossville, Baltimore county. One stack, 30 x 7½, built in 1849; hot blast; open top; annual capacity, 2,600 net tons. Uses local ore mined at the furnace. Brand, "Locust Grove." For lease. John S. Hayes, Agent.
- Maryland Furnaces, H. W. Ellicott, Baltimore. Two stacks, each 50 x 10, built in 1853 and 1870; hot blast; closed tops; total annual capacity, 8,000 net tons. Use argillaceous ore mined near Baltimore. Specialty, car wheel and malleable pig iron. Brand, "Maryland."
- Muirkirk Furnace, Muirkirk Iron Co., Muirkirk, Prince George's county. One stack, 27 x 8½, built in 1847; hot blast; closed top; oak and pine charcoal; annual capacity, 3,000 net tons. Ores mined in the neighborhood. Pig iron used for car-wheels, guns, flange iron, shot and shell. Average tensile strength of six specimens of No. 4 pig, 41,329 lbs. Brand, "Muirkirk." Charles E. Coffin, President, and W. C. Odiorne, Secretary and Treasurer.
- Principio Furnace, Geo. P. Whitaker, Principio, Cecil county. One stack, 33 x 8, built in 1700, and rebuilt in 1835; warm blast; water-power. Uses equal proportions of Baltimore hone ore and Iron Hill (Delaware) magnetic ore, brought from mines belonging to same owner in Baltimore county, Maryland, and Newcastle county, Delaware. Specialty, car-wheel pig iron. Brand, "Principio."
- Stickney Furnace, Stickney Iron Co., 11 South Gay st., Baltimore.

Formerly called Lazaretto Furnace. One stack, 50 x 9, built in 1854, and rebuilt in 1871; hot blast. Uses Baltimore ore exclusively. Product, pig iron, specially adapted to malleable castings and car-wheels. Brand, "Stickney Iron Co." Geo. H. Stickney, President; Wm. Harvey, Secretary; Wm. Gerhauser, Manager.

Number of charcoal furnaces: 15 stacks.

ANTHRACITE.

Ashland Iron Co., Ashland, Baltimore county. 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. No. 3 has the only closed top. Nos. 1 and 2 are blown by steam and water power; No. 3, by steam. Total annual capacity, 20,000 net tons. Use hematite ore from Baltimore and Carroll counties, Md., and York county, Pa. Specialty, foundry pig iron. Brand, "Ashland." President, George Small, Baltimore; Secretary and Manager, Walter S. Franklin, Ashland.

Cedar Point Furnace, Baltimore Iron Co., Baltimore. One stack, 44 x 12, built in 1873; closed top; annual capacity, 6,000 net tons. *See Charcoal Furnaces.*

Number of anthracite furnaces: 4 stacks.

BITUMINOUS COAL OR COKE.

Antietam Furnace, Quitman P. Ahl, Sharpsburgh, Washington county. One stack, 50 x 11, built in 1838; water-power. Brown hematite ore from the vicinity of Harper's Ferry is used. Product, principally No. 3 mill pig iron.

Bowery Furnace, Cumberland Coal and Iron Co., Frostburg, Alleghany county. One stack, 56 x 14½, built in 1868; rebuilt in 1873. General office, 52 Broadway, New York: Wm. M. Richards, President, and J. Richards, Secretary. Out of blast since 1874.

Catoctin Furnace, J. B. Kunkel, Catoctin Furnaces, Frederick county. One stack, 50 x 11½, built in 1873-4; open top; used Connellsville coke in 1875; annual capacity, 6,000 net tons. *See Charcoal Furnaces.*

Elk Ridge Furnace, T. H. Brown, Elk Ridge Landing, Howard county. One stack, 32 x 10, rebuilt in 1855; open top; annual capacity, 3,000 net tons. Not in blast since January, 1874.

Knoxville Furnace, C. S. Maltby, Knoxville, Frederick county. One stack, 41 x 12½, built in 1837. Formerly, Longacoming Furnace. Not in blast since 1874.

Number of raw coal and coke furnaces: 5 stacks. Total number of furnaces in Maryland: 24 stacks. Messrs. Skelding, Wright & McGowan ran a cupola at Mount Savage for a small part of 1877, making mill pig iron from slag.

VIRGINIA.

CHARCOAL.

- Amherst Furnace, Wm. H. Jordan (executor of estate of S. F. Jordan), Big Island, Bedford county. Furnace in Amherst county. One stack, 36 x 9, built in 1863; warm blast; water-power.
- Barren Springs Furnace, J. W. McGavock, Reed Island, Wythe county. One stack, 35 x 8, built in 1853, and rebuilt in 1873; put in blast August 1, 1873; cold blast.
- Brown Hill Furnace, A. & W. M. Painter, Brown Hill, Wythe county. One stack, 32 x 9, built in 1810; cold blast; water-power.
- Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe county. One stack, 32 x 9, built in 1832; cold blast; water-power. *See Gray Eagle Furnace. See Rolling Mills. See Bloomaries.*
- Columbia Furnace, John Wissler & Son, Columbia Furnace, Shenandoah county. One stack, 34 x 11, rebuilt in 1809; cold blast; water-power; brown hematite ore; specialty, car-wheel pig iron. Brand, "Columbia."
- Glenwood Furnace, New Jersey Iron Co. of Virginia, Glenwood, Rockbridge county. One stack, 35 x 8½, rebuilt in 1874; open top; warm blast; water-power; annual capacity, 2,000 net tons. President, Theodore F. Randolph, Morristown, New Jersey; Treasurer, Charles Runyon, 111 Broadway, New York.
- Grace Furnace, Tredegar Company, Wm. T. Patton, Agent, Grace Furnace, Botetourt county. One stack, 33 x 9½, built in 1850, burned in 1864, rebuilt in 1873, and put in blast in 1874; cold blast; closed top; annual capacity, 1,600 net tons. *See Rolling Mills.*
- Gray Eagle Furnace, Graham & Robinson, Brown Hill, Wythe county. One stack, 33 x 9, built in 1863; cold blast; water-power; annual capacity, 600 net tons. *See Cedar Run Furnace. See Rolling Mills. See Bloomaries.*
- Laurel Furnace, P. A. Howard, Cumberland Gap, Tennessee. Furnace in Lee county, Virginia. One stack, 28 x 8, rebuilt in 1873; cold blast; water-power. *See Tennessee Furnaces.*
- Liberty Furnace, Wissler, Armstrong & Stone, Liberty Furnace, Shenandoah county. One stack, 30 x 8½, built in 1821; cold blast; water-power.
- Mine Run Furnace, Wm. Boyer, Mine Run Furnace, Shenandoah county. One stack, 32 x 6½, built in 1872; cold blast; water-power.
- Mount Vernon Furnace, Mount Vernon Iron Works Co., lessees, Weyer's Cave, Rockingham county. One stack, 35 x 8½, built in 1848, and rebuilt in 1874, after a long rest; put in blast Sept. 25, 1875; cold blast; steam and water-power; closed top. Uses neutral hema-

- tites only. Brand, "Mount Vernon." Jerome Keeley, President, 220 South Fourth st., Philadelphia. *See Bloomaries.*
- Oxford Iron Works, D. W. Moore, Mount Athos, Campbell county. One stack, built prior to 1837; hot blast.
- Panic Furnace, Peter Gallagher & Co., Wytheville. One stack, built in 1875, and blown in August 9, 1875; cold blast; capacity, 8 net tons per day.
- Panther Gap Furnace, Panther Gap Iron Co., Goshen, Rockbridge county. One stack, 38 x 9, completed in December, 1874; cold blast.
- Radford Furnace, Radford Iron Co., Radford Furnace, Pulaski county. One stack, 35 x 10, built in 1868; warm blast. Not in blast since 1876. Richard Wood, President, 400 Chestnut st., Philadelphia.
- Raven Cliff Furnace, Crockett, Sanders & Co., Wytheville, Wythe county. One stack, 29 x 9, built in 1810, and rebuilt in 1876; cold blast; water-power. *See Wythe Furnace. See Bloomaries.*
- Salisbury Furnace, Salisbury Iron Manufacturing Co., Fincastle, Botetourt county. One stack, 32 x 10, built in 1869; hot and cold blast; open top; water-power; annual capacity, 3,000 net tons. Product, car-wheel pig iron. Brand, "Virginia Salisbury." Out of blast in 1878. W. F. Mattes, Superintendent in 1877.
- Shenandoah Iron Works, Wm. Milnes, Jr., lessee, Shenandoah Iron Works, Page county. Two stacks, each 33 x 9, built in 1836 and 1857; hot blast. One of them has not been in blast for several years. The other has an annual capacity of 3,000 net tons. *See Bloomaries.*
- Sinking Creek Furnace, I. Willcox Brown, Newport, Giles county. One stack, 35 x 9½, built in 1873; hot blast; water-power. E. P. Williams, Superintendent.
- Speedwell Furnace, Speedwell Iron Co., Speedwell, Wythe county. One stack, 32 x 9, built in 1873-4; cold blast; water-power; open top.
- Van Buren Furnace, Frank King, Van Buren Furnace, Shenandoah county. One stack, 37½ x 9½, built in 1850, rebuilt in 1870; closed top; cold blast, but arranged for hot; annual capacity, 2,500 net tons. Hematite ore mined on the furnace property. Product, car-wheel pig iron. Brand, "King."
- Victoria Furnace, Ira F. Jordan & Co., Tolersville, Louisa county. One stack, 33 x 8½, built in 1835; warm blast; open top; annual capacity, 1,200 net tons.
- Virginia Furnace, B. P. Gaw & Co., Waynesboro, Augusta county. One stack, 32 x 9, built in 1804; hot blast. Ores used are honey-combed and red and black hematite. Product, foundry pig iron, very soft and strong. Brand, "Virginia." Formerly, Mount Torrey Furnace.
- Walton Furnace, Howard & Sanders, Max Meadows, Wythe county.

One stack, 33 x 9, built in 1872; cold blast; open top; annual capacity, 1,600 net tons. Out of blast since 1874.

Wythe Furnace, Crockett, Sanders & Co., Wytheville, Wythe county.

One stack, built in 1873; cold blast; water-power. *See Raven Cliff Furnace. See Bloomaries.*

Number of charcoal furnaces: 27 stacks.

COKE.

Buffalo Gap Furnaces, Virginia Iron and Steel Co., Buffalo Gap, Augusta county. Two stacks, 35 x 9, and 40 x 10½, built in 1869 and 1873, respectively; closed tops; coke; total annual capacity, 9,000 net tons. Product, neutral pig iron, from brown hematite ore. Brand, "Buffalo Gap." President, H. W. Howell, New York; Secretary and Treasurer, H. J. Rogers, New York; Consulting Engineer, William M. Bowron; Resident Agent, Captain D. P. McCorkle.

Callie Furnace, D. S. Cook, (of Wrightsville, Pennsylvania,) Clifton Forge, Alleghany county. One stack, 36 x 9, built in 1873-4 for charcoal, but changed to coke in 1875; uses rich neutral hematite, fossil, and red shale ores, mined on the furnace property.

Ferrol Furnace, Call & Jones, lessees, Ferrol P. O., Augusta county. One stack, 40 x 10, built in 1864, rebuilt in 1878; closed top; fuel, New river coke; annual capacity, 5,000 net tons. Managing Partner, T. C. Jones, late Secretary of the Powhatan Iron Co.

Lucy Selina Furnace, Longdale Iron Co., Longdale, Alleghany county. One stack, 60 x 11, built in 1827, rebuilt in 1873, and raised to 60 feet in 1876; hot and cold blast; closed top; coke; water and steam power; annual capacity, 8,000 net tons. Ore, brown hematite, mined near the furnace. Product, principally gray forge pig iron. Brand, "Longdale." F. A. Comly, President, 407 Walnut st., Philadelphia; J. E. Johnson, Manager. E. L. Harper & Co., Cincinnati, sole Western sales agents.

Number of coke furnaces: 5 stacks.

ANTHRACITE.

Powhatan Iron Works, Powhatan Iron Co., Richmond. Furnace in Henrico county. One stack, 48 x 13, built in 1860, and rebuilt in 1872-3; open top; water-power; annual capacity, 7,000 net tons.

Number of anthracite furnaces: 1 stack. Total number of furnaces in Virginia: 33 stacks.

NORTH CAROLINA.

CHARCOAL.

Buckhorn Furnace, American Iron and Steel Co., Lockville, Chatham county. One stack, 54 x 10, built in 1873; hot blast; water-power;

- closed top; annual capacity, 4,500 net tons. George G. Lobdell, President; George G. Lobdell, Jr., Secretary; W. W. Lobdell, Treasurer; J. H. Wissler, Superintendent. *See Endor Furnace.*
- Endor Furnace, American Iron and Steel Co., Lockville, Chatham county. One stack, 39 x 8, remodeled in 1872-3; hot blast; closed top; annual capacity, 2,500 net tons. *See Buckhorn Furnace.*
- Madison Furnace, Jonas W. Derr, Lincolnton, Lincoln county. One stack, 32 x 6, built in 1810; cold blast; water-power. *See Bloomaries.*
- Ore Hill Furnace, S. H. Wiley, Salisbury. Works at Ore Hill, Chatham county. One stack, 30 x 8, built in 1862; hot blast; daily capacity, 10 net tons. Not in blast since 1873.
- Rehoboth Furnace, John Leonard & Co., Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810; cold blast; water-power; annual capacity, 1,200 net tons. *See Bloomaries.*
- Stonewall Furnace, Estate of James M. Smith, Iron Station, Lincoln county. One stack, 32 x 7, built in 1863; cold blast; water-power; annual capacity, 600 net tons. Not in blast for several years. *See Vesuvius Furnace.*
- Vesuvius Furnace, Estate of James M. Smith, Iron Station, Lincoln county. One stack, 32 x 8, built in 1780; cold blast; water-power; annual capacity, 700 net tons. Not in blast for several years. *See Stonewall Furnace.*
- Number of furnaces in North Carolina: 7 charcoal stacks.

GEORGIA.

CHARCOAL.

- Bear Mountain Furnaces, Thomas & Brown, Cartersville, Cass county. Furnaces in Bartow county. Two stacks, 32 x 7½, built in 1842; cold blast; water-power; open tops; total annual capacity, 2,400 net tons. Not in blast since 1875.
- Cherokee Iron Works, Cherokee Iron Co., Cedartown, Polk county. One stack, 60 x 12½, built in 1874-5; blown in March 22, 1877; closed top; hot blast; annual capacity, 8,000 net tons. A. G. West, President and Superintendent; John H. Browning, of New York, Treasurer; W. S. Kenyon, Secretary.
- Diamond Furnace, W. P. Ward, Cartersville, Cass county. Furnace in Bartow county. One stack, 28 x 7½, built in 1856; cold blast; water-power; product, spiegeleisen and ferro-manganese.
- Etna Furnace, Alfred Shorter, Rome. Furnace in Polk county. One stack, 44 x 10, built in 1870; cold blast; capacity, 10 to 12 net tons daily. Not in blast for several years.
- Pool Furnace, B. G. Pool, Cartersville, Cass county. Furnace in Bar-

tow county. One stack, 33 x 8, built in 1855; cold blast; water-power. Not in blast since 1876.

Ridge Valley Furnace, Floyd county, eight miles north of Rome, on the Selma, Rome & Dalton Railroad. One stack, 43 x 10, built in 1873-4. Out of blast for several years.

Rogers Furnace, Rogers & Co., Cartersville, Cass county. Furnace in Bartow county. One stack, 36 x 9, built in 1873; cold blast; open top; annual capacity, 2,500 net tons.

Number of charcoal furnaces: 8 stacks.

COKE.

Bartow Furnaces, Vulcan Iron and Nail Works, lessees, Chattanooga, Tennessee. Works at Bartow Iron Works, Bartow county. Two stacks, 36 x 9, and 58 x 12, built in 1871 and 1873, respectively; closed tops; annual capacity, No. 1, 2,500 net tons; No. 2, 6,000 net tons. *See Rolling Mills in Tennessee.*

Rising Fawn Furnace, Rising Fawn Iron Co., Rising Fawn, Dade county. One stack, 63 x 16, built in 1873-5; put in blast June 18, 1875; 3 Whitwell hot-blast stoves; open top; annual capacity, 14,400 net tons. Uses fossiliferous ore, mined near the furnace. B. E. Wells, Receiver; L. S. Colyar, Treasurer; Geo. H. Hazlehurst, Manager.

Number of coke furnaces: 3 stacks. Total number of furnaces in Georgia: 11 stacks.

ALABAMA.

CHARCOAL.

Alabama Furnace, Alabama Iron Co., Alabama Furnace, Talladega county. One stack, 41½ x 8½, built in 1873; hot blast; open top, with thimble; annual capacity, 9,000 net tons. Uses brown hematite ore. Product, foundry pig iron, slightly cold short. Stephen S. Glidden, President and Manager; Horace Ware, Vice-President; James L. Orr, Treasurer.

Bibb Furnace, Brierfield, Bibb county. One stack, 40 x 8, built in 1864; cold blast; out of blast since 1874. For sale.

Cornwall Iron Works, Cornwall Iron Co., Cedar Bluff, Cherokee county. One stack, 44 x 9, built in 1862; cold blast; water-power.

Rock Run Furnace, Pleasant Gap, Cherokee county. One stack, 38 x 9, built in 1873-4; put in blast June 1, 1874; hot blast; annual capacity, 4,000 net tons; closed top. Out of blast since 1875.

Round Mountain Furnace, Round Mountain Coal and Iron Co., E. A. Williams, President and General Manager, Rome, Georgia. Furnace at Round Mountain, Cherokee county, Alabama. One stack, 45 x 8½, built in 1853; rebuilt and put in blast in June, 1874, after a long rest;

cold blast; closed top; annual capacity, 5,000 net tons. Uses red fossiliferous ore, yielding 58 per cent. Specialty, car-wheel pig iron. Brand, "Round Mountain."

Shelby Furnaces, Shelby Iron Co., Shelby Iron Works, Shelby county. Two stacks, 56 x 12 and 60 x 14, built in 1863 and 1873, respectively; warm blast; closed tops; total annual capacity, 13,000 net tons. Brown hematite ore obtained on the furnace property. Product, car-wheel pig iron. Brand, "Shelby." President, John W. Lapsley; Secretary, Charles J. Hazard; Superintendent, J. F. Black.

Stonewall Iron Works, Stonewall Iron Co., Stonewall, Cherokee county. One stack, 40 x 11, built in 1873; hot blast; open top; annual capacity, 6,000 net tons. J. W. Bones, President and Treasurer; A. J. T. Swords, Manager.

Tecumseh Furnace, Tecumseh Iron Co., Tecumseh, Cherokee county. One stack, 60 x 12, first put in operation February 19, 1874; hot blast; closed top; annual capacity, 8,000 net tons. Brown hematite ore. Product, foundry pig iron. Brand, "Tecumseh." Willard Warner, President and Manager; A. E. Buck, Secretary and Treasurer.

Woodstock Furnace, Woodstock Iron Co., Anniston, Calhoun county. One stack, 43 x 12, first blown in April 13, 1873; hot and cold blast; closed top; annual capacity, 6,000 net tons. Product, car-wheel pig iron and spiegeleisen. President, Alfred L. Tyler; Secretary and Treasurer, Samuel Noble.

Number of charcoal furnaces: 10 stacks.

COKE.

Eureka Company, Oxmoor, Jefferson county. Two stacks: No. 1, 60 x 16, completed in July, 1877; No. 2, 60 x 14, completed in March, 1876; closed tops; total annual capacity, 23,000 net tons. President, J. W. Sloss, Birmingham, Ala.; Vice-President, B. F. Guthrie, Louisville, Ky.; Secretary and Treasurer, Dr. D. B. Miller, Cincinnati; Superintendent, James Thomas, Oxmoor, Ala.

Woodstock P. O., Bibb county. One stack, building. Giles Edwards, proprietor, expects to complete the furnace in 1878.

Number of coke furnaces: 2 completed stacks and 1 building. Total number of furnaces in Alabama: 12 completed stacks, and 1 building.

TEXAS.

Kelly Furnace, Jefferson Iron Co., Jefferson, Marion county. One stack, 34 x 9½, built in 1869; rebuilt in 1873-4; hot and cold blast; brown hematite ore. G. A. Kelly, President.

Number of furnaces in Texas: 1 charcoal stack.

WEST VIRGINIA.

COKE.

- Belmont Furnace, Belmont Nail Works, Wheeling. One stack, 63 x 14, first blown in September 4, 1875; closed top; annual capacity, 18,000 net tons. Uses Connellsville coke and Lake Superior and Missouri ores. Specialty, mill pig iron. Brand, "Belmont." *See Rolling Mills.*
- Irondale Furnace, Felix Nemezyei, Raccoon, Preston county. One stack, 40 x 12, built in 1861; repaired in 1877. Product, neutral pig iron. Brand, "F. N." Alexander Strausz, General Agent.
- Quinnimont Furnace, J. H. Bramwell, Quinnimont, Fayette county. One stack, 60 x 15, built in 1874. The product is principally foundry pig iron for machine shops and mixtures for car-wheels.
- Riverside Furnace, Riverside Iron Works, Wheeling. Furnace in Marshall county. One stack, 75 x 18, built in 1872 and remodeled in 1876; closed top; annual capacity, 26,000 net tons. Uses best grades of Lake Superior and Missouri ores. Brand, "Riverside." *See Rolling Mills.*
- Waldorf Furnace, C. S. Hurd, lessee, (A. J. Ulman, owner, 25 Gay st., Baltimore,) Irontown, Taylor county. One stack, 50 x 12, built in 1873; uses local limestone ore; fuel, coke; closed top; annual capacity, 6,000 net tons. Formerly called Lancaster Furnace.
- Wheeling Iron and Nail Co., Wheeling. One stack, 65 x 18, built in 1873-4. Not in operation since it was built. *See Rolling Mills.*
- Number of coke furnaces: 6 stacks.

CHARCOAL.

- Bloomery Furnace, Pancoast & Magee, Bloomery P. O., Hampshire county. One stack, 30 x 7, built in 1844; put in blast November 1, 1873, after a long rest; open top; product, car-wheel and mill pig iron; weekly capacity, 30 net tons.
- Braxton Furnace, P. B. Adams & Co., Strange Creek, Braxton county. One stack, 42 x 11½, first blown in Oct. 1, 1875; cold blast; annual capacity, 5,000 net tons. Formerly called Elk River Furnace.
- Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county. One stack, 32 x 7, built in 1822. *See Bloomeries.*
- Gladeville Furnace, Gladeville Furnace Co., Gladeville, Preston county. One stack, 36 x 7, built in 1872; warm blast.
- Kanawha Iron Co., Charleston, Jefferson county. One stack, 48 x 13, begun in 1875; closed top; Whitwell hot-blast; daily capacity to be 40 net tons. Not finished. N. I. Bigley, President, and G. L. Drouillard, Secretary.
- Virginia Furnace, Horace Landen, Muddy Creek P. O., near Kingwood, Preston county. One stack, 30 x 6, built in 1853; water-power; daily capacity, 6 net tons.

Number of charcoal furnaces: 5 completed stacks and 1 building. Total number of furnaces in West Virginia: 11 completed stacks and 1 building.

KENTUCKY.

BITUMINOUS COAL OR COKE.

Ashland Furnace, Lexington and Big Sandy R. R. Co., Douglass Putnam, Jr., Agent, Ashland, Boyd county. One stack, 62 x 15, built in 1869; 3 Whitwell hot-blast stoves, each 50 x 16, added in 1877; closed top; raw coal; annual capacity, 15,000 net tons. Ores used are a mixture of Missouri and native ores. Brand, "Ashland." John Means, President; John G. Peebles, Vice-President; Wm. F. Gaylord, Treasurer; Robert Peebles, Secretary.

Licking Furnace, Swift's Iron and Steel Works, Cincinnati, O. Works at Newport, Ky. One stack, 65 x 16, built in 1859, enlarged in 1869; closed top; coke; annual capacity, 17,000 net tons. E. L. Harper & Co., Cincinnati, sales agents. *See Rolling Mills.*

Norton Iron Works, Ashland, Boyd county. One stack, 68 x 18, built in 1873; blew in February 16, 1874; closed top; remodeled and improved in 1877 by the addition of the Ferrie coking and calcining principle and the erection of 4 Whitwell hot-blast stoves, each 50 x 16. *See Rolling Mills.*

Princess Furnace, Culbertson, Means & Culbertson, Ashland, Boyd county. One stack, 50 x 12, first blown in in May, 1877; closed top; built to take the place of Buena Vista (charcoal) Furnace; fuel, raw coal; 3 Whitwell hot-blast stoves.

Number of bituminous furnaces: 4 stacks.

HANGING ROCK DISTRICT.—CHARCOAL.

Bellefonte Furnace, Means, Russell & Means, 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.

Boone Furnace, F. M. Thompson, Boone Furnace P. O., Carter county. One stack, 43 x 10, built in 1855; hot blast; open top; annual capacity, 4,500 net tons. Not in blast since 1874. N. A. L. Marchant, Agent.

Buffalo Furnace, Culbertson, Earhart & Co., Greenupsburg, Greenup county. Furnace at Argillite. One stack, 40 x 10½, built in 1851; hot and cold blast; fuel, half charcoal and half wood; annual capacity, 3,000 net tons.

Charlotte Furnace, Charlotte Furnace Co., lessees, (owned by Iron Hills Furnace and Mining Co.,) Charlotte Furnace P. O., Carter county. One stack, 50 x 11, built in 1873; iron shell; warm blast; closed top; annual capacity, 4,000 net tons. President, Matthew Ellis; Secretary

and Treasurer, H. W. Bates; Manager, A. C. Van Dyke. Formerly called Iron Hills Furnace.

Hunnewell Furnace, Eastern Kentucky Railway Co., H. W. Bates, Vice-President, Riverton, Greenup county. One stack, $46\frac{1}{2} \times 11\frac{1}{2}$, built in 1852; hot blast; open top; annual capacity, 6,000 net tons; limestone and kidney ores; specialty, foundry pig iron. Brand, "Hunnewell." *See Pennsylvania Furnace.*

Kenton Furnace, Damarin & Co., Quincy, Lewis county. Office at Portsmouth, Ohio. One stack, 36×11 , built in 1856; open top; hot blast; annual capacity, 4,000 net tons. *See Hamden Furnace, Hanging Rock region, Ohio.*

Laurel Furnace, Joshua Kelley, Riverton, Greenup county. One stack, 39×11 , built in 1849; open top; cold and hot blast; annual capacity, 3,000 net tons. Out of blast since 1874.

Mount Savage Furnace, Mount Savage Furnace Co., lessees, (owned by Lexington and Carter County Mining Co.,) Mount Savage, Carter county. One stack, 40×11 , built in 1848; hot blast; open top; annual capacity, 4,000 net tons.

Pennsylvania Furnace, Eastern Kentucky Railway Co., Riverton, Greenup county. One stack, 37×11 , built in 1848; open top; hot blast; annual capacity, 4,000 net tons; limestone and kidney ores; specialty, foundry pig iron. Brand, "Pennsylvania." *See Hunnewell Furnace.*

Raccoon Furnace, Raccoon Mining and Manufacturing Co., Greenupsburg, Greenup county. One stack, $35 \times 10\frac{1}{2}$, built in 1831; open top; cold and hot blast; annual capacity, 4,000 net tons.

Number of charcoal furnaces in Hanging Rock region: 10 stacks.

MISCELLANEOUS.—CHARCOAL.

Bath Furnace, Andrew J. Ewing, Young's Springs, Bath county. One stack, $40 \times 10\frac{1}{2}$, built in 1839, rebuilt in 1872-3; cold blast.

Centre Furnace, D. Hillman & Sons, Tennessee Rolling Works, P. O., Lyon county. One stack, 50×12 , built in 1852; hot and cold blast; daily capacity, $14\frac{1}{2}$ net tons. *See Trigg Furnace. See Rolling Mills.*

Cottage Furnace, Cottage Furnace Co., Mount Sterling, Montgomery county. Furnace in Estill county. One stack, $38 \times 10\frac{1}{2}$, built in 1855; cold blast. Joel McKinney, Manager.

Estill Furnace, Red River Iron Manufacturing Co., Fitchburg, Estill county. One stack, 32×10 , built in 1830; cold blast. E. D. Standiford, President, Louisville. Not in blast since 1874. *See Red River Furnaces.*

Laura Furnace, John P. Pringle & Co., Laura Furnace, Trigg county. One stack, 36×9 , built in 1851; cold blast. Out of blast since 1874.

Red River Furnaces, Red River Iron Manufacturing Co., Fitchburg, Es-

till county. Two stacks, each 50 x 14, built in 1869; cold blast; open tops. Not in blast since 1874. *See Estill Furnace.*

Trigg Furnace, D. Hillman & Sons, Trigg Furnace, Trigg county. Office at Tennessee Rolling Works, Lyon county. One stack, 48 x 12, built in 1871; hot and cold blast; daily capacity, 18 net tons. *See Centre Furnace. See Rolling Mills.*

Number of charcoal furnaces outside of Hanging Rock region: 8 stacks.
Total number of furnaces in Kentucky: 22 stacks.

TENNESSEE.

EASTERN REGION.—BITUMINOUS COAL OR COKE.

Chattanooga Iron Co., Chattanooga, Hamilton county. One stack, 61 x 12½, completed in 1874; blown in in September, 1874; closed top; annual capacity, 8,000 net tons. Uses red fossiliferous and brown hematite ores. President, James C. Warner, Nashville; Superintendent, Edward Doud.

Oakdale Furnace, Oakdale Iron Co., Kingston, Roane county. Works at Oakdale, Roane county. One stack, 65 x 16½, built in 1873; put in blast November 11, 1873. Uses red fossiliferous ores.

Rockwood Furnaces, Roane Iron Co., C. Constable, Superintendent, Rockwood, Roane county. Office at Chattanooga. Two stacks, 65 x 16, and 56 x 14, built in 1867 and 1872; fuel, raw coal and coke; closed tops; total annual capacity, 24,000 net tons. *See Rolling Mills.*

Southern States Coal, Iron and Land Co. Limited, South Pittsburgh, Marion county. Building two stacks. One will be completed in 1878. It will be 70 x 20, will be supplied with Whitwell hot-blast stoves, and will be expected to make 600 tons a week. James Bowron, Superintendent; Edmund C. Pechin, Furnace Manager.

Number of bituminous coal or coke furnaces: 4 completed stacks and 2 building.

EASTERN OR UNAKA REGION.—CHARCOAL.

Carter Furnace, Knoxville Carwheel Co., Knoxville. Furnace in Carter county. One stack, 32 x 8, built in 1840; cold blast; water-power. A. L. Maxwell, President, and C. D. Thurber, Secretary.

Eagle Furnace, Bristol, Sullivan county. One stack, 33 x 8, built in 1838; cold blast; water-power. Out of blast since 1875.

Embreeville Furnace, Bradley & Co., Jonesboro, Washington county. One stack, 32 x 8½, built in 1846. Out of blast since 1874.

Pottsdale Furnace, New York and East Tennessee Iron Co., Greeneville, Greene county. One stack, 32 x 8½, built in 1862; cold blast; water-power; open top; annual capacity, 2,500 net tons. George Taylor, President; F. A. Potts, Secretary and Treasurer, 110 Broadway, New

York; J. A. Trim, Agent, Greeneville, Tenn. Out of blast since February, 1874.

Rose and Crockett Iron Works, P. A. Howard, Cumberland Gap, Claiborne county. One stack, 32 x 9, built in 1823. *See Virginia Furnaces.*
Speedwell Furnace, Woodson, Rose & Harbison, Speedwell, Claiborne county. One stack, 30 x 9, built in 1825; cold blast; water-power; annual capacity, 1,000 net tons.

Unaka Furnace, W. F. Gleason, Unaka, Greene county. One stack, 33 x 10½, built in 1868; hot blast. Out of blast since 1874.

Number of charcoal furnaces in Eastern region: 7 stacks.

WESTERN REGION.—CHARCOAL.

Bear Spring Furnace, J. C. Steger, Trustee for Woods, Yeatman & Co., Cumberland Iron Works, Stewart county. One stack, 38 x 11½, built in 1832, abandoned in 1854, and rebuilt in 1873; open top; either hot or cold blast; yearly capacity, 5,000 net tons. Ore, native brown hematite. Pig iron used for stoves, malleable work, and boiler plate. *See Dover Furnace.*

Brownsport Furnace, Charles B. Young, Brownsport Furnace, Decatur county. One stack, 40 x 12, built in 1850; hot blast.

Clark Furnace, La Grange Iron Works, Danville, Benton county. Furnace in Stewart county. One stack, 36 x 10, built in 1854, hot blast. J. C. Garrett, President. *See La Grange Furnaces.*

Cumberland Furnace, J. P. Drouillard, Cumberland Furnace, Dickson county. One stack, 35 x 10½, built in 1825; hot blast; open top; annual capacity, 4,000 net tons.

Dover Furnace, J. C. Steger, Trustee for Woods, Yeatman & Co., Cumberland Iron Works, Stewart county. One stack, 34½ x 10, built in 1828, abandoned in 1834, rebuilt in 1854, and repaired in 1873; open top; cold blast; annual capacity, 3,600 net tons. Ore, native brown hematite. Pig iron used for car-wheels and boiler plate. *See Bear Spring Furnace.*

La Grange Furnace, La Grange Iron Works, Danville, Benton county. Furnace in Stewart county. One stack, 35 x 9½, built in 1832; hot blast. *See Clark Furnace.*

Napier Furnace, R. C. Napier, Columbia, Maury county. Furnace in Lewis county. One stack, 35 x 9, repaired in 1873; cold blast. Idle since 1876.

Rough and Ready Furnace, I. Westheimer, Pittsburgh, Pa. Works at Rough and Ready Furnace, Stewart county. One stack, 35 x 10, built in 1850; hot blast.

Vernon Furnace, Sechler, McCullough & Co., Vernon Furnace, Montgomery county. One stack, 34 x 10½, built in 1833; hot blast; closed top; annual capacity, 4,000 net tons.

Wayne Furnace, Gaylord, Son & Co., (of Cincinnati, Ohio,) G. W. Boyd, Superintendent, Wayne Furnace, Wayne county. One stack, 42 x 11, built in 1856; hot blast.

Worley Furnace, A. B. Payne, Nashville. Furnace near Dickson, Dickson county. One stack, 36 x 9, built in 1847; hot blast. Ore, principally brown hematite. Product, mainly mill iron, very tough. Out of blast since October, 1876.

Number of furnaces in Western region: 11 stacks. Total number of furnaces in Tennessee: 22 completed stacks and 2 building.

OHIO.

HANGING ROCK.—CHARCOAL.

Bloom Furnace, John Paull & Co., Bloom Switch, Scioto county. One stack, 33 x 11, built in 1832, and rebuilt in 1846; annual production, 3,000 net tons; hot blast; open top. Furnace building lighted at night by natural gas from an 800-foot well. For sale. F. E. Duduit, Manager, Portsmouth, Ohio.

Buckeye Furnace, Buckeye Furnace Co., Berlin X Roads, Jackson county. One stack, 37 x 11, built in 1851; open top; hot and cold blast; annual capacity, 4,000 net tons. L. Davis, Superintendent and Agent, and T. J. Williams, Secretary.

Buckhorn Furnace, Charcoal Iron Co., Ironton, Lawrence county. One stack, 36 x 9½, built in 1834; open top; annual production, 4,000 net tons. Ran on stone coal part of 1877. Cold-blast charcoal pig iron is branded "Jessie." S. C. Johnson, President; John Campbell, Vice-President; C. L. Nevins, Secretary. *See Howard Furnace.*

Cambria Furnace, David Lewis & Co., Samsonville, Jackson county. One stack, 38 x 11, built in 1854; hot blast; open top; annual capacity, 4,000 net tons. Out of blast since 1875.

Centre Furnace, W. D. Kelly & Sons, Ironton, Lawrence county. One stack, 40 x 10½, built in 1837; open top; hot blast; annual capacity, 4,000 net tons. *See Grant Furnace.*

Clinton Furnace, Wm. J. Bell, Wheelersburg, Scioto county. One stack, 31 x 9½, built in 1832; hot blast; open top; annual capacity, 5,020 net tons. Not in blast since October, 1873.

Cornelia Furnace, Cornelia Furnace Co., Hamden Junction, Vinton county. Furnace in Jackson county. One stack, 37 x 10½, built in 1853; open top; hot and cold blast; annual capacity, 4,000 net tons. Formerly called Lincoln Furnace.

Eagle Furnace, Reed's Mills, Vinton county. Owned by P. A. Sanns and others, of Gallipolis, Ohio. One stack, 32½ x 11, built in 1852; open top; hot blast; annual capacity, 4,500 net tons.

- Etna Furnace, Etna Iron Works, George Willard, President, Ironton, Lawrence county. One stack, 37 x 10½, built in 1832; open top; hot and cold blast; annual capacity, 4,000 net tons. *See Vesuvius Furnace and Etna (coke) Iron Works.*
- Gallia Furnace, Norton, Campbell & Co., Portsmouth, Scioto county. Furnace in Gallia county. One stack, 36 x 10, built in 1847; open top; hot blast; annual capacity, 4,000 net tons. Product, pig iron for foundry and machine purposes.
- Grant Furnace, W. D. Kelly & Sons, Ironton, Lawrence county. One stack, 42 x 11, built in 1869; open top; hot blast; annual capacity, 5,000 net tons. *See Centre Furnace.*
- Hamden Furnace, Damarin & Co., Portsmouth, Scioto county. Furnace at Reed's Mills, in Vinton county. One stack, 34 x 11, built in 1854; hot blast; open top; annual capacity, 4,000 net tons. *See Kenton Furnace, Kentucky.*
- Hecla Furnace, Hecla Iron and Mining Co., Ironton, Lawrence county. One stack, 36 x 10½, built in 1833; cold blast; open top; annual capacity, 3,500 net tons. Product, car-wheel pig iron. John Campbell, President, and Charles Campbell, Secretary and Treasurer.
- Hope Furnace, Hope Furnace P. O., Vinton county. Owned by Ashford Poston of Nelsonville, Ohio, and others. One stack, 36 x 10½, built in 1854; open top; hot blast; annual capacity, 4,000 net tons.
- Howard Furnace, Charcoal Iron Co., Ironton, Lawrence county. Furnace in Scioto county. One stack, 36 x 10½, built in 1853; open top; hot blast; annual capacity, 4,500 net tons. Ran on stone coal part of 1877. *See Buckhorn Furnace.*
- Jefferson Furnace, Jefferson Furnace Co., Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854; open top; cold blast; annual capacity, 5,000 net tons.
- Keystone Furnace, H. S. Bundy, Keystone Furnace, Jackson county. One stack, 36 x 10½, built in 1849; open top; hot blast; annual capacity, 4,000 net tons. E. L. Harper & Co., Cincinnati, sole sales agents.
- Latrobe Furnace, J. C. H. Cobb, Berlin X Roads, Jackson county. One stack, 35 x 10, built in 1854; open top; hot blast; annual capacity, 4,000 net tons. Uses native limestone ore. Product, foundry pig iron. E. L. Harper & Co., Cincinnati, sole sales agents.
- Lawrence Furnace, Lawrence Furnace Co., Ironton, Lawrence county. One stack, 38 x 11, built in 1834; hot blast; fuel, charcoal, coke, and coal; open top; annual capacity, 4,500 net tons. A. B. Cole, President; W. H. Peters, Secretary; George Peters, Vice-President and Manager.
- Logan Furnace, Logan Furnace Co., Logan, Hocking county. One

- stack, 29 x 10, built in 1852; open top; hot blast; annual capacity, 3,500 net tons. Will remain idle until the price of pig iron advances. S. Churchill, President, and C. H. Rippey, Secretary.
- Madison Furnace, Clare, Duduit & Co., Clay, Jackson county. One stack, 37 x 9½, built in 1854; hot blast; open top; annual capacity, 3,500 net tons. Uses native limestone red ore.
- Monitor Furnace, Newcomb & Whitman, lessees, Ironton, Lawrence county. Furnace at Petersburg. One stack, 50 x 11, built in 1868; annual production, 4,500 net tons; open top; hot blast. H. D. Newcomb, Manager.
- Monroe Furnace, Union Iron Co., Portsmouth, Scioto county. Furnace in Jackson county. One stack, 37 x 12, built in 1856; hot blast; open top; annual capacity, 5,000 net tons. John Campbell, President, and Wm. M. Bolles, Secretary. *See Washington (bituminous) Furnace.*
- Mount Vernon Furnace, H. Campbell & Sons, Ironton, Lawrence county. One stack, 32 x 10, built in 1833; hot blast; open top; annual capacity, 4,400 net tons. Uses native hematite ore. Product, foundry pig iron. Jno. W. Campbell, Manager. *See Sarah (bituminous) Furnace.*
- Ohio Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. Furnace in Scioto county. One stack, 36 x 11½, built in 1845; open top; hot blast; annual capacity, 4,000 net tons. Product, principally foundry pig iron. Thomas W. Means, President, and E. B. Willard, Secretary and Treasurer. *See Pine Grove Furnace.*
- Olive Furnace, Campbell, McGugin & Co., Ironton, Lawrence county. One stack, 37 x 10½, built in 1846; hot blast; open top; annual capacity, 4,000 net tons.
- Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 36 x 12, built in 1829; open top; hot blast; annual capacity, 4,500 net tons. Product, principally foundry pig iron. *See Ohio Furnace.*
- Richland Furnace, Richland Furnace Co., Richland, Vinton county. One stack, 40 x 10½, built in 1854; open top; hot blast; annual capacity, 4,000 net tons. Formerly called Cincinnati Furnace. I. Lord, President; Wm. Poland, Treasurer, Chillicothe; A. J. Smart, Secretary.
- Scioto Furnace, L. C. Robinson & Co., Portsmouth, Scioto county. One stack, 32 x 10½, built in 1844; open top; hot blast; annual capacity, 4,000 net tons.
- Union Furnace, B. C. & R. D. McManigal, Union Furnace P. O., Hocking county. One stack, 32 x 10, built in 1853; open top; hot blast; annual capacity, 3,500 net tons. Expect to change to stone coal, or to build a stone coal furnace soon.
- Vesuvius Furnace, Etna Iron Works, Ironton, Lawrence county. One

stack, 32 x 9, built in 1833; cold blast; open top; annual capacity, 3,000 net tons. *See Etna Furnace and Etna (coke) Iron Works.*

Total number of charcoal furnaces in Hanging Rock region: 31 stacks.

BITUMINOUS COAL OR COKE.

Belfont Furnace, Belfont Iron Works Co., Ironton, Lawrence county. One stack, 66 x 16, built in 1868; closed top; fuel, Connellsville coke and Kanawha coal; annual capacity, 15,000 net tons. *See Rolling Mills.*

Eliza Furnace, Harvey Wells, owner and manager, Wellston, Jackson county. One stack, 46 x 12, built in 1877 from material of the abandoned Ophir Furnace and blown in October 30, 1877; closed top; raw coal; annual capacity, 4,500 net tons. Native ores (block and limestone) are used. Specialty, No. 1 foundry pig iron. Robert Hoop, founder, and Waldo Murray, Secretary. E. L. Harper & Co., Cincinnati, sales agents.

Etna Iron Works, Ironton. Two stacks: Alice, 86 x 18, first blown in Sept. 13, 1875; closed top; Whitwell hot-blast stoves; Ferrie self-coking apparatus; annual capacity, 20,000 net tons. Blanche, 86 x 18, nearly finished to mate the Alice, will not be put in blast until trade revives. Geo. Willard, President; E. Bixby, Vice-President; Geo. K. Hosford, Secretary and Treasurer. E. L. Harper & Co., Cincinnati, sales agents. *See Etna and Vesuvius (charcoal) Furnaces.*

Fulton Furnace, Globe Iron Co., Jackson, Jackson county. One stack, 50 x 11½, built in 1868; closed top; fuel, raw coal; annual capacity, 4,000 net tons. *See Globe Furnace.*

Globe Furnace, Globe Iron Co., Jackson, Jackson county. One stack, 46½ x 12, built in 1872; closed top; fuel, raw coal; annual capacity, 4,000 net tons. *See Fulton Furnace.*

Huron Furnace, Huron Iron Co., Jackson, Jackson county. One stack, 49 x 11½, first blown in April 19, 1875; closed top; annual capacity, 5,500 net tons. Lot Davis, President; M. D. Jones, Secretary; Miles Jones, Manager.

Ironton Furnace, Iron and Steel Co., Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; closed top; fuel, coke and raw coal; daily capacity, 50 net tons. Daniel R. Wolfe, Secretary. *See Rolling Mills.*

Milton Furnace, Milton Furnace and Coal Co., Wellston, Jackson county. One stack, 50 x 12, built in 1873-4; put in blast June 6, 1874; Whitwell hot-blast stoves; fuel, raw coal; closed top; annual capacity, 5,000 net tons. Ore used is Hanging Rock limestone. Product, soft, open-grained foundry pig iron, known as "American Scotch." H. S. Willard, President and Superintendent; J. E. Ferree, Secretary.

Orange Furnace, Orange Iron Co., Jackson, Jackson county. One stack, 40 x 10, built in 1864; closed top; annual capacity 4,000 net tons. Out of blast since 1874.

Sarah Furnace, H. Campbell & Sons, Ironton, Lawrence county. One stack, 50 x 14, built in 1877; blown in March 18, 1878; Whitwell hot-blast stoves; annual capacity, 10,000 net tons. Uses native hematite ore. Product, foundry and mill pig iron. J. H. Campbell, Manager. *See Mount Vernon (charcoal) Furnace.*

Star Furnace, Star Furnace Co., Jackson, Jackson county. One stack, 50 x 11½, completed August 20, 1866; fuel, raw coal; ore, native; bell-and-hopper top; annual capacity, 4,082 net tons. Isaac Brown, President; B. Kahn, Secretary; Thomas M. Jones, Manager; Henry Price, Mining Engineer.

Tropic Furnace, Tropic Furnace Co., Jackson, Jackson county. One stack, 47 x 11½, built in 1872-3; closed top; fuel, raw coal; annual capacity, 5,500 net tons. E. T. Jones, President, and D. D. Morgan, Secretary.

Vinton Furnace, Bancroft & Rader, Vinton Station, Vinton county. One stack, 50 x 11, built in 1854; closed top; annual capacity, 6,000 net tons. Uses native coke which is made in Belgian ovens, and claimed to be equal to Connellsville.

Washington Furnace, Union Iron Co., Portsmouth, Scioto county. Furnace in Lawrence county. One stack, 35 x 10, built in 1853; altered from charcoal to bituminous coal and coke in 1877; open top; annual capacity, 4,000 net tons. *See Monroe (charcoal) Furnace.*

Wellston Furnaces, Wellston Coal and Iron Co., Wellston, Jackson county. Two stacks, each 53 x 11½, built in 1874-5; closed tops; total annual capacity, 12,000 net tons. H. S. Bundy, President; M. Grove, Financial Agent; Theodore Flenhart, Secretary.

Number of bituminous furnaces in Hanging Rock region: 17 stacks.

MAHONING VALLEY.—BITUMINOUS COAL OR COKE.

Ada Furnace, Mahoning Iron Co., Lowellville, Mahoning county. One stack, 56 x 15, built in 1845; rebuilt of iron in 1872.

Ashland Furnace, Jonathan Warner, Mineral Ridge, Trumbull county. One stack, 45 x 12, built in 1859; block coal; closed top; annual capacity, 9,000 net tons. Not in blast for several years.

Brier Hill Furnace, Brier Hill Iron and Coal Co., Youngstown, Mahoning county. One stack, 47 x 12, built in 1846; fuel, coke and block coal. Idle since 1873. President, John Stambaugh; Secretary and Treasurer, Nelson Crandall; Manager, J. G. Butler, Jr. *See Grace Furnace.*

Brown, Bonnell & Co., Youngstown, Mahoning county. Two stacks: Falcon, 60 x 14, built about 1850, and Phoenix, 65 x 16, built in 1854;

fuel, block coal and Connellsville coke; closed tops; total annual capacity, 32,000 net tons. Use Lake Superior ores. Product, foundry and mill pig iron. *See Rolling Mills.*

Eagle Furnace, Eagle Furnace Co., Youngstown, Mahoning county. One stack, 51 x 13½, built in 1846; closed top; fuel, raw coal and Connellsville coke; annual capacity, 12,500 net tons. Uses Lake Champlain and Lake Superior ores. Product, principally mill pig iron for Cartwright, McCurdy & Co., and Bessemer pig iron. W. H. McCurdy, President; W. B. Hazeltine, Vice-President; James Cartwright, Treasurer; Henry Manning, Secretary.

Elizabeth Furnace, A. M. Robbins, Niles, Trumbull county. One stack, 65 x 14½, built in 1859. Out of blast since 1874. Formerly owned by James Ward & Co.

Girard Furnace, Girard Iron Co., Girard, Trumbull county. One stack, 58 x 15, built in 1866; closed top; fuel, raw coal and coke; annual capacity, 17,000 net tons. Uses Lake Superior ore. Product, Bessemer and mill pig iron. Brand, "Girard." Wm. R. Drake, Manager.

Grace Furnace No. 2, Brier Hill Iron and Coal Co., Youngstown, Mahoning county. One stack, 57 x 17, built in 1861; fuel, coke and raw coal; closed top; annual capacity, 20,000 net tons. Uses Lake Superior specular ore. Specialty, Bessemer pig iron. Brand, "Brier Hill." Grace Furnace, No. 1, 47 x 14, built in 1860, was torn down in 1873 with intention to rebuild, which has not yet been done. *See Brier Hill Furnace.*

Haselton Furnaces, Andrews Brothers, Haselton, Mahoning county. Two stacks, 56 x 18, and 56 x 13½, built in 1867 and 1868; fuel, block coal and coke; combined daily capacity, 100 net tons. Product, Bessemer and mill pig iron from Lake Superior ores, and "American Scotch" pig iron from a black band ore obtained at Mineral Ridge, 12 miles from the furnaces.

Himrod Furnaces, Himrod Furnace Co., Youngstown, Mahoning county. Two stacks, 70 x 15, and 70 x 18, built in 1859 and 1860; rebuilt in 1876; fuel, mainly raw coal; ores, Lake Superior for mill iron, and Lake Superior and Lawrence county (Pa.) limestone for foundry iron; closed tops; annual capacity, No. 1, 15,000 net tons; No. 2, 20,000 net tons. Another stack, 48 x 13, built in 1868, has been virtually abandoned until it can be rebuilt. Brand, "Himrod." R. A. Wight, President; Robert Kelly, Secretary, P. O. Box 157, New York; A. B. Cornell, Treasurer and Manager, Youngstown, Ohio.

Hubbard Furnaces, Andrews & Hitchcock, Youngstown, Mahoning county. Works at Hubbard, Trumbull county. Two stacks, each 60 x 16, built in 1867 and 1872; fuel, ½ Connellsville coke and ¼ block

coal; total annual capacity, 32,000 net tons. 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.

Kitty Furnace, Wm. Ward & Co., Niles, Trumbull county. One stack, $55\frac{1}{2} \times 12\frac{1}{2}$, built in 1870.

Struthers Furnace, Struthers Furnace Co., lessee, Struthers Station, Mahoning county. One stack, 54×16 , built in 1869; open top; uses $\frac{3}{8}$ block coal and $\frac{1}{2}$ Connellsville coke; annual capacity, 20,000 net tons. Uses Lake Superior ores. Product, Bessemer pig iron. Thos. W. Kennedy, Manager, and H. T. Stewart, Agent.

Number of bituminous furnaces in the Mahoning valley: 17 stacks.

HOCKING VALLEY.—BITUMINOUS COAL OR COKE.

Akron Furnace, Akron Iron Co., Akron, Summit county. Furnace at Bessemer, Athens county. One stack, 50×16 , built at Akron in 1872; removed to Bessemer in 1877, and blown in November 30, 1877; fuel, raw coal; closed top; annual capacity, 8,500 net tons. Uses native ore, mined near the furnace. Specialty, A No. 1 foundry pig iron. J. R. Buchtel, Superintendent and General Manager. *See Rolling Mills.*

Baird Furnace, Baird Iron Co., Gore, Hocking county. One stack, $44 \times 11\frac{1}{2}$, built in 1874-5, and blown in October 9, 1875; closed top; annual capacity, 5,600 net tons. Uses raw splint coal and native limestone ore. Brand, "Baird." President, Walter Crafts; Secretary, C. F. Eisele; Manager, Frederick Eisele.

Bessie Furnace, Moss & Marshall, New Straitsville, Perry county. One stack, 50×14 , built in 1877-8, and blown in January 21, 1878; 3 Whitwell hot-blast stoves, each 36×15 ; fuel, raw coal; native limestone ores and one-fourth Lake Superior ore; annual capacity, 10,000 net tons. Product, foundry pig iron. Brand, "Bessie." B. Marshall, Manager. E. L. Harper & Co., Cincinnati, sole sales agents.

Crafts Iron Co., Gore, Hocking county. One stack, 58×15 , building in 1878; closed top; to use raw coal and native limestone ore. The machinery of this furnace was formerly used for Kenton Furnace at Newport, Kentucky, dismantled in 1877. Larz Anderson, Jr., President; Walter Crafts, Treasurer and Manager; Grove Stoddard, Secretary.

Fannie Furnaces, Licking Iron Co., Newark, Licking county. Furnaces at Shawnee, Perry county. Two stacks: No. 1, 50×12 , built in 1874-5 at Newark, removed to Shawnee in 1876; went out of blast at Newark on April 15, 1876, and was blown in at Shawnee on September 15, 1876; closed top; six 4-inch tuyeres; annual capacity,

- 5,000 net tons. No. 2, 50 x 13, first put in blast October 10, 1877; closed top; six 4-inch tuyeres; Weimer patent hot-blast; annual capacity, 8,000 net tons. Coal, lime, and blackband iron ore are found near the furnaces. Product, "American Scotch" foundry pig iron. William Shields, President; E. S. McKinlay, Secretary and Treasurer; George Shields, Superintendent. E. L. Harper & Co., Cincinnati, sole sales agents.
- Mollie Furnace, Joseph Vilas, Shawnee, Perry county. One stack, 50 x 14½, first blown in November 10, 1877; closed top; fuel, raw coal; annual capacity, 9,000 net tons.
- Monday Creek Furnace, Monday Creek Iron Co., Cleveland. Furnace at Bessemer, Athens county. One stack, 52½ x 14, built in 1877-8, and blown in in March, 1878; fuel, raw coal mined on the property; ore, Hanging Rock limestone and Lake Superior. This furnace was built at Columbus in 1870 by the Columbus Iron Co., and removed to the Hocking valley in 1877. F. A. Bates, President, Cleveland; F. B. Baird, General Manager; J. B. Richards, Secretary, Bessemer P. O.
- Moxahala Furnace, Moxahala Iron Co., Moxahala, Perry county. One stack, 55½ x 15, built in 1877-8, blown in January 5, 1878; fuel, coke and raw coal; closed top; annual capacity, 10,000 net tons. Uses Lake Superior ore and native black band. Specialty, soft fluid foundry pig iron. Brand, "Moxahala." President and Treasurer, W. C. Lemert; Secretary, M. P. Wright; Manager, J. G. Chamberlain.
- Ogden Furnace, Ogden Iron Co., Orbiston, Hocking county. Chicago office at 40 and 42 Dearborn st. One stack, 50 x 15, built in 1877; blown in in December, 1877; 3 Whitwell hot-blast stoves, 28½ x 15; raw coal; native and Lake Superior ores.
- Thomas Iron Works, Gore, Hocking county. One stack, 47 x 12½, built in 1876, blown in Dec. 8, 1876; raw coal; annual capacity, 6,000 net tons; product, American Scotch pig iron. S. Churchill, President, and C. H. Rippey, Secretary.
- XX Furnace, Newark Coal and Iron Co., Newark, Licking county. Furnace at Shawnee, Perry county. One stack, 50 x 14, first blown in January 18, 1877; native ore exclusively; product, principally foundry pig iron; daily capacity, about 22 net tons. T. J. Davis, President and Treasurer; James H. Smith, Secretary. E. L. Harper & Co., Cincinnati, sole sales agents.
- Winona Furnace, Winona Iron Co., Winona Furnace P. O., Hocking county. One stack, 50 x 12½, completed and blown in Feb. 20, 1878; Whitwell hot-blast stoves; fuel, raw coal; closed top; annual capacity, 6,000 net tons. President, S. Churchill; Secretary and Treasurer, E. B. Greene, Jr.; Manager, Augustus Magoon.

Number of bituminous furnaces in the Hocking valley: 12 completed stacks, and 1 stack building.

MISCELLANEOUS.—BITUMINOUS COAL OR COKE.

- Bellaire Nail Works, Bellaire, Belmont county. One stack, 65 x 16, built in 1873; put in blast September 18, 1875; closed top; coke; annual capacity, 13,000 net tons. *See Rolling Mills.*
- Benwood Iron Works, Wheeling, West Virginia. Furnace at Martinsville, Belmont county, Ohio. One stack, 51 x 12½, built in 1866; fuel, Connellsville and Steubenville coke. *See West Virginia Rolling Mills.*
- Cherry Valley Furnaces, Cherry Valley Iron Co., Leetonia, Columbiana county. Two stacks, each 55 x 14, built in 1867, and blown in in January, 1868; closed tops; fuel, coke and raw coal; total annual capacity, 24,000 net tons. Use native ore and Lake Superior ore mixed. Specialty, foundry pig iron. Brand, "Cherry Valley." *See Rolling Mills.*
- Emma Furnace, Union Iron Works Co., Cleveland, Cuyahoga county. One stack, 65 x 16, built in 1872; closed top; fuel, raw coal and coke; ore, Lake Superior; estimated daily production, 60 net tons. *See Rolling Mills.*
- Fairfield Furnace, Tuscarawas Coal and Iron Co., Canal Dover, Tuscarawas county. One stack, 45 x 14, built in 1854; raw coal; closed top; annual capacity, 6,000 net tons. President, J. F. Card, 130 Water st., Cleveland, Ohio; Secretary, Henry Anderman, Canal Dover. *See Rolling Mills.*
- Franklin Furnace, Franklin Iron Co., Columbus, Franklin county. One stack, 62 x 17, completed in November, 1873; raw coal and coke; closed top; annual capacity, 18,000 net tons. Isaac Eberly, President, and N. Mithoff, Secretary. Out of blast since June, 1874.
- Glasgow-Port-Washington Iron and Coal Co. Limited, Port Washington, Tuscarawas county. Two stacks, each 70 x 17½, built in 1873-4; one stack first blown in in August, 1874; fuel, hitherto, Connellsville coke; closed tops; total annual capacity, 33,000 net tons. Ore, a mixture of native blackband and Lake Superior hematite. Product, foundry pig iron. President, James Reid Stewart, Glasgow, Scotland; Secretary, Lawrence Hill Watson; General Agent at works, William Rennie.
- Graffton Furnaces, Graffton Furnace Co., Leetonia, Columbiana county. Two stacks, 54 x 14, and 54 x 16, built in 1866 and 1872; fuel, coke and raw coal. Office, 97 Water st., Pittsburgh: John Graff, President.
- Jefferson Iron Works, Steubenville, Jefferson county. Two stacks, each 56 x 13, built in 1863 and 1865, and rebuilt in 1877; closed tops; total annual capacity, 30,000 net tons. Use Missouri and Lake Superior ore. Specialty, gray forge pig iron. *See Rolling Mills.*
- Massillon Furnace, J. P. Burton, Massillon, Stark county. One stack,

45 x 14, built in 1854; raw coal; black band ore; annual capacity, 6,000 net tons.

Mingo Furnaces, Mingo Iron Works Co., Mingo Junction, Jefferson county. Two stacks: No. 1, 60 x 15½, built in 1871; No. 2, called "Estella," 60 x 16½, was built in 1872 and first put in blast in May, 1873; fuel, Connellsville and native coke; closed tops; total annual capacity, 36,000 net tons. Use Lake Superior and Missouri ores. Specialty, mill pig iron. Brand, "Mingo." Mason W. Burt, President; Wm. Dean, Vice-President; Geo. A. Dean, Secretary.

Morgan Furnace, Hale & Doolittle, Chicago. Works at Irondale, Jefferson county. One stack, 60 x 16, built in 1870; coke; closed top; annual capacity, 12,000 net tons. *See Rolling Mills.*

Newburgh Furnaces, Cleveland Rolling-Mill Co., Cleveland, Cuyahoga county. Two stacks: one 60 x 16, built in 1864; the other, 60 x 16½, built in 1872, was put in blast in October, 1872; closed tops; fuel, raw coal and coke; Lake Superior ore; total annual capacity, 33,000 net tons. *See Rolling Mills.*

Proton Furnace, Cleveland Iron Co., Cleveland, Cuyahoga county. One stack, 60 x 16, built in 1869; fuel, coke and raw coal. *See Rolling Mills.*

Steubenville Furnace, Steubenville Furnace and Iron Co., Steubenville, Jefferson county. One stack, 60 x 16, built in 1872, and blown in in December, 1872; native coke; closed top; annual capacity, 15,000 net tons. Uses Lake Superior ore. Specialty, mill pig iron. President, L. Raney; Vice-President, M. S. Stokely; Secretary, T. C. Carothers; Treasurer, Wm. H. Mooney.

Volcano Furnace, Volcano Furnace Co., Massillon, Stark county. One stack, 44 x 14, built in 1855; closed top; annual capacity, 6,000 net tons. Uses native black band ore, mined in Tuscarawas county. Specialty, American Scotch pig iron. James Lee, President; Anthony Howells, Treasurer and Manager. Out of blast for several years.

Zanesville Furnace, Ohio Iron Co., Zanesville, Muskingum county. One stack, 59 x 15, built in 1870-1, and blown in Sept. 7, 1871; bell-and-hopper top; fuel, raw coal and coke; annual capacity, 14,000 net tons. Uses ½ Lake Superior and ¾ native ore. Specialty, forge pig iron. *See Rolling Mills.*

Number of bituminous coal or coke furnaces in Ohio, outside of the Hanging Rock, Mahoning valley and Hocking valley districts: 23 stacks.

CHARCOAL.—MISCELLANEOUS.

Antwerp Furnace, Antwerp Furnace Co., Antwerp, Paulding county. One stack, 42 x 8½, built in 1865. Uses Lake Superior ores. Product, principally car-wheel pig iron. A. Cobb, Agent, 112 Superior st., Cleveland.

Manhattan Furnace, D. L. Davies, Assignee, Toledo, Lucas county. Furnace at Ironville, in Toledo. One stack, 40 x 9, built in 1866; warm blast; daily capacity, 14 net tons. Uses Lake Superior ores. Brand, "Manhattan."

Paulding Furnace, Paulding Furnace Co., Cecil, Paulding county. One stack, 42 x 10, built in 1865; hot blast; closed top; annual capacity, 6,000 net tons. John F. R. Evans, Superintendent. *See Bloomaries.*

Number of charcoal furnaces in Ohio, outside of Hanging Rock region: 3 stacks. Total number of furnaces in Ohio: 103 completed stacks, and 1 building.

INDIANA.

RAW BITUMINOUS BLOCK COAL.

Brazil Furnace, George B. Yandes, Trustee, Brazil, Clay county. One stack, 61 x 14, built in 1867, and blown in in December, 1867; closed top; annual capacity, 12,000 net tons. Uses Lake Superior ore. Specialty, Bessemer pig iron. Brand, "Brazil." Major Collins, Manager.

Greene County Iron Works Co., Worthington, Greene county. Addressed also at Indianapolis. Building one stack, 50 x 14; closed top; to use block coal; estimated annual capacity, 8,000 net tons. S. D. Jones, President; J. W. King, Secretary; C. N. Shaw, Treasurer; J. P. Woodard, Vice-President and Manager.

Lafayette Furnace, Lafayette Iron Co., Brazil, Clay county. Located at Otter Creek, $2\frac{1}{2}$ miles from Brazil. One stack, 45 x 10 $\frac{1}{2}$, built in 1868; annual capacity, 10,000 net tons. B. F. Maston, Secretary.

Vigo Furnaces, Vigo Iron Co., Terre Haute, Vigo county. Two stacks, each 52 x 12, built in 1869 and 1872, and blown in in 1870 and 1873; fuel, raw coal; one open top and one closed; combined annual capacity, 15,000 net tons. Use Missouri ore. Specialty, mill pig iron. Brand, "Vigo." President, A. L. Crawford; Secretary, Treasurer and Manager, A. J. Crawford.

Western Furnaces, Western Iron Co., Knightsville, Clay county. Two stacks, each 48 x 12 $\frac{1}{2}$, built in 1867 and 1868; total annual capacity, 15,000 net tons. *See Rolling Mills.*

Number of bituminous furnaces: 6 completed stacks, and 1 building. The Runser Iron Co., S. Runser, Superintendent, run a small cupola at Knightsville, Clay county, which remelts slag and turns out a small quantity of pig iron.

CHARCOAL.

Nelson Furnace, Nelson Furnace Co., Joseph B. Fordice, Receiver, Shoals, Martin county. * One stack, 60 x 13, built in 1872; hot blast; closed top; annual capacity, 7,000 net tons. Uses $\frac{2}{3}$ native ore to $\frac{1}{3}$ Missouri ore.

Number of charcoal furnaces: 1 stack. Total number of furnaces in Indiana: 7 completed stacks, and 1 building.

ILLINOIS.

BITUMINOUS COAL OR COKE.

Big Muddy Furnace, Wm. I. & B. W. Lewis, Grand Tower, Jackson county. Office at St. Louis, Missouri. One stack, 69 x 17, built in 1871; weekly capacity, 315 net tons.

Grand Tower Furnaces, Grand Tower Mining, Manufacturing and Transportation Co., Grand Tower, Jackson county. Two stacks, each 68 x 16, built in 1868; open tops; fuel, $\frac{3}{4}$ Big Muddy coal, and $\frac{1}{4}$ Big Muddy coke; Missouri ores; No. 1 has been partially demolished; total annual capacity, 27,000 net tons; product, Bessemer pig iron. Brand, "Grand Tower." Not in blast since March, 1876. Thomas M. Williamson, Superintendent.

Illinois Furnace, Illinois Furnace Co., Elizabethtown, Hardin county. One very old stack, 39 x 11, probably the first built in Illinois, repaired in 1873; controlled by Indianapolis capital.

Joliet Iron and Steel Co., 95 Dearborn st., Chicago. Works at Joliet, Will county. Two stacks, each 72 x 20, built in 1873; coke; closed tops; total annual capacity, 75,000 net tons. Built to use Lake Superior and Missouri ores and to make Bessemer pig iron. Not yet in operation. *See Rolling Mills.*

Meier Iron Co., Bessemer Station, near East Carondelet, St. Clair county. Office, 26 North Main st., St. Louis. Two stacks, each 60 x 17, built in 1873-5; Whitwell hot-blast stoves; closed tops; total annual capacity, 40,000 net tons. Adolphus Meier, President; Edward D. Meier, Secretary; Adolphus Meier, Jr., Treasurer. Not yet in operation.

North Chicago Rolling Mill Co., Chicago. Two stacks, each 66 x 17, built in 1869; coke; closed tops; total annual capacity, 45,000 net tons. Use Lake Superior ore. Specialty, Bessemer pig iron. J. H. Cremer, Manager. *See Wisconsin Furnaces. See Rolling Mills in Illinois and Wisconsin.*

Union Rolling Mill Co., Chicago. Two stacks, each 60 x 14 $\frac{1}{2}$, built in 1869; closed tops; fuel, Connellsville coke and Indiana coal; total annual capacity, 44,800 net tons. Use Lake Superior ore. Specialty, Bessemer pig iron. *See Rolling Mills.*

Total number of furnaces in Illinois: 12 bituminous stacks.

MICHIGAN.

CHARCOAL.

Bangor Furnace, Bangor Furnace Co., Bangor, Van Buren county. One stack, 43 x 10, first blown in October 29, 1872; hot blast; bell-and-

hopper top; annual capacity, 14,000 net tons. Uses Lake Superior ores. Specialty, Bessemer pig iron. A. B. Hough, President, Cleveland, Ohio; D. C. Bradley, Vice-President, 42 Dearborn st., Chicago; C. D. Rhodes, Treasurer, Chicago; Henry Ford, Secretary and General Manager, Bangor, Michigan.

Carp River Furnace, (Peninsular Iron Co., owner,) Carp River Iron Co., lessee, Marquette, Marquette county. One stack, 45 x 10, built in 1872-3; hot or cold blast; closed top; annual capacity, 6,000 net tons. Product, Bessemer, car-wheel, and malleable pig iron. John Burt, President; W. A. Burt, Secretary; H. A. Burt, Treasurer and Manager. Caseville Furnace, Pigeon River Furnace and Salt Co., Caseville, Huron county. One stack, 45 x 9½, built in 1873; hot blast. Wm. McKinley, Agent. Not in blast for several years.

Champion Furnace, C. Sprong, lessee, (owned by Estate of Menominee Iron Co.,) Menominee, Menominee county. One stack, 45 x 9½, built in 1872-3; blown in in August, 1873; hot blast; closed top; annual capacity, 10,000 net tons. Uses Lake Superior ore. Specialty, Bessemer pig iron. Brand, "Champion." Sole Agents, Cherrie & Cox, Chicago.

Deer Lake Furnaces, Deer Lake Iron and Lumber Co., Ishpeming, Marquette county. Two stacks: one, 47 x 8, built in 1868; the other, 47 x 9, was built in 1873, and put in blast in October, 1873; both hot blast; water-power; total annual capacity, 8,000 net tons. Use Lake Superior ore, ⅔ hard specular, and ⅓ hematite. Product, Bessemer pig iron. Brand, "Deer Lake." Gardiner Greene, President, Norwich, Connecticut; Theo. F. McCurdy, Secretary and Treasurer, Norwich, Connecticut; E. R. Hall, Agent, Ishpeming, Michigan.

Detroit and Lake Superior Iron Manufacturing Co., Detroit, Wayne county. One stone stack, 42 x 9½, built in 1857; warm blast; open top; annual capacity, 5,000 net tons. Uses Lake Superior specular, magnetic, and hematite ores. The pig iron is specially adapted to malleable castings. Edward C. Walker, President; Wm. H. Barnum, Vice-President; Wm. M. Gaylord, Secretary and Manager.

Elk Rapids Furnace, Elk Rapids Iron Co., Elk Rapids, Antrim county. One stack, 47 x 11½, built in 1873; put in blast in July, 1873; hot blast; 4 4-inch tuyeres; uses Lake Superior ores; product used for car-wheels and malleable castings; capacity, daily, 45 net tons.

Escanaba Furnace, Escanaba, Delta county. One stack, 51½ x 12, built in 1872-3; put in blast in February, 1873; hot blast. Not in blast for several years.

Eureka Furnace, Eureka Iron Co., Detroit. Furnace at Wyandotte, Wayne county. One stack, 45 x 9, built in 1853; hot blast; annual

capacity, 7,000 net tons. Uses Lake Superior ores. Product, foundry, Bessemer, and car-wheel pig iron. W. N. Carpenter, President; W. S. Armitage, Secretary and Treasurer. *See Ward Furnace. See Rolling Mills.*

Frankfort Furnaces, Frankfort Furnace Co., Detroit. Furnaces at South Frankfort, Benzie county. Two stacks, each $42 \times 9\frac{1}{2}$, built in 1870 and 1873; hot blast; open tops; total annual capacity, 13,500 net tons. W. C. Colburn, President; Edward Kanter, Vice-President; E. H. Rees, Secretary and Manager. Out of blast for several years.

Iron Cliffs Co., Negaunee, Marquette county. Three stacks: Cliffs Furnace, $48 \times 9\frac{1}{2}$, built in 1867, and rebuilt in 1873; Pioneer Furnace No. 1, $47 \times 9\frac{1}{2}$, built in 1858, and burnt and rebuilt in 1877; Pioneer Furnace No. 2, $40 \times 9\frac{1}{2}$, built in 1859. Use Lake Superior ore, $\frac{2}{3}$ red specular and $\frac{1}{3}$ soft hematite. Product, Bessemer pig iron. Brands, "Pioneer" and "Cliffs."

Jackson Furnaces, Jackson Iron Co., Fayette, Delta county. Two stacks, each $40 \times 9\frac{1}{2}$, built in 1867 and 1869; hot blast; open tops; ore, Jackson specular, and South Side maganiferous hematite; total annual capacity, 22,000 net tons; product, Bessemer pig iron. Iron is known as "Fayette." These furnaces are 100 miles from the Company's mines, at Negaunee, and were built at Fayette on account of the abundance of timber. There are 58 charcoal kilns. Fayette Brown, General Agent, Cleveland, Ohio; J. B. Kitchen, Agent, Fayette, Mich.

Lawton Furnace, Michigan Central Iron Co., Lawton, Van Buren county. One stack, $40 \times 9\frac{1}{2}$, built in 1867; blown in in December, 1867; hot blast; open top; annual capacity, 11,000 net tons. Uses Lake Superior ore. Product, foundry, malleable, and car-wheel pig iron. Brand, "Lawton." President, Gen. Q. A. Gilmore; Secretary and Treasurer, D. Van Nostrand; Agent and Manager, J. C. Ford.

Leland Furnace, Wyandotte Rolling Mill Co., Leland, Leelenaw county. Office at Detroit. One stack, 48×10 , rebuilt in 1872; hot blast; closed top; water-power; annual capacity, 9,000 net tons. Uses Lake Superior ore.

Munising Furnace, Munising Iron Co., Munising, Schoolcraft county. One stack, 40×9 , built in 1867; hot blast; closed top; water-power; annual capacity, 12,000 net tons. President, Wm. L. Wetmore, Marquette; Secretary, E. P. Williams, Marquette; Treasurer, Geo. H. Vaillant, Cleveland, O.; Manager, S. Brownell, Munising, Mich. Formerly called Schoolcraft Furnace.

Peninsular Furnace, Peninsular Iron Co., Detroit, Wayne county. One stack, $42\frac{3}{4} \times 9\frac{1}{2}$, built in 1863; hot blast; open top, covered by a plate when not filling; annual capacity, 6,000 net tons. Uses Lake Superior

ore. Specialty, Nos. 2, 3, and 4 pig iron. Brand, "P. I. Co., DET." Union Iron Co., Detroit, Wayne county. One stack, 50 x 11, built in 1871-2, and blown in in July, 1872; warm blast; closed top; annual capacity, 10,000 net tons. Uses Lake Superior ore. Specialty, malleable and car-wheel pig iron. Brand, "U. I. Co., Det." President, Wells Burt; Secretary, Treasurer, and Manager, Austin Burt; Assistant Manager, Lee Burt.

Ward Furnace, Eureka Iron Co., lessee, Detroit. One stack, 45 x 9½, built in 1862; hot blast; closed top; annual capacity, 8,000 net tons. Uses Lake Superior ore. *See Eureka Furnace. See Rolling Mills.*
Number of charcoal furnaces: 23 stacks.

ANTHRACITE AND BITUMINOUS COAL OR COKE.

Grace Furnace, Lake Superior Iron Co., Marquette, Marquette county. One stack, 60 x 17, built in 1872; closed top; fuel, mixed anthracite and bituminous coal; annual capacity, 15,000 net tons.

Hamtramck Furnace, Hamtramck Iron Co., Detroit, Wayne county. One stack, 53 x 13, built in 1870; open top; fuel, bituminous coal. Not in blast since 1873. E. C. Walker, President; Geo. H. Russel, Secretary and Treasurer; Geo. B. Russel, Manager; R. S. Dillon, Superintendent.

Rolling Mill Furnace, Marquette and Pacific Rolling Mill Co., Marquette, Marquette county. One stack, 60 x 15, built in 1868; rebuilt in 1873; closed top; fuel, anthracite and bituminous coal and coke; annual capacity, 14,000 net tons. *See Rolling Mills.*

Number of anthracite and bituminous coal and coke furnaces: 3 stacks.
Total number of furnaces in Michigan: 26 stacks.

WISCONSIN.

CHARCOAL.

Appleton Furnace Co., Appleton, Outagamie county. Two stacks, each 40 x 8½, built in 1871 and 1872; open tops; hot blast; water-power; total annual capacity, 15,000 net tons. Use Lake Superior ore. Product, Bessemer and foundry pig iron. Augustus Ledyard Smith, President; Henry A. Foster, Vice-President; Henry D. Smith, Secretary and Treasurer.

Fond du Lac Furnace, C. J. L. Meyer, Fond du Lac, Fond du Lac county. One stack, 50 x 10½, built in 1873-4; not yet in blast.

Fox River Iron Co., West Depere, Brown county. Two stacks, each 40 x 9½; one built in 1869; the other built in 1872, put in blast in January, 1873; hot blast; closed tops; total annual capacity, 10,000 net tons. Use Lake Superior ore. Product, Bessemer and foundry pig iron. D. W. Blanchard, President and Treasurer; D. D. Kellogg, Secretary; S. D. Arnold, Vice-President and Manager.

Green Bay Iron Co., Green Bay, Brown county. One stack, 39 x 9, built in 1870; closed top; hot blast; annual capacity, 7,000 net tons. In hands of assignees.

Iron Ridge Furnace, Wisconsin Iron Co., Iron Ridge, Dodge county. One stack, 40 x 9½, built in 1865; hot blast; open top; annual capacity, 4,000 net tons. O. W. Potter, President; J. J. Hagerman, Secretary; J. C. Ricketson, Treasurer and General Agent; W. G. Sterling, Superintendent.

Ironton Furnace, John F. Smith, Ironton, Sauk county. One stack, 30 x 8, built in 1857; warm blast; open top; steam and water power; annual capacity, 2,000 net tons. Native brown hematite ore is used. Product, foundry pig iron. Brand, "Sauk."

National Furnaces, H. D. Smith, lessee, Depere, Brown county. Two stacks: one, 45 x 10, built in 1869; the other, 48 x 12, built in 1872, put in blast in March, 1873; hot blast; bell-and-hopper tops; combined annual capacity, 12,000 net tons.

North Western Iron Co., Mayville, Dodge county. Office, 328 East Water st., Milwaukee. One stack, 40 x 9½, built in 1853 and rebuilt in 1872; weekly production, 100 net tons. I. M. Bean, President; S. Marshall, Vice-President; J. C. Spencer, Secretary; C. F. Ilsley, Treasurer.

Richland Iron Co., 328 East Water st., Milwaukee. Works at Cazenovia, Richland county. One stack, 45 x 9, completed in 1876; hot blast. I. M. Bean, President; A. C. May, Vice-President; J. C. Spencer, Secretary; C. F. Ilsley, Treasurer.

Number of charcoal furnaces: 12 stacks.

HALF ANTHRACITE COAL AND HALF COKE.

Bay View Furnaces, North Chicago Rolling Mill Co., Chicago, Ill. Works at Bay View, near Milwaukee. Two stacks, each 66 x 17, built in 1870 and 1871; total annual capacity, 35,000 net tons. Formerly belonged to Milwaukee Iron Co. *See Illinois Furnaces. See Rolling Mills of Illinois and Wisconsin.*

Minerva Iron Co., Milwaukee. One stack, 55 x 15, built and put in blast in the summer of 1873; annual capacity, 15,000 net tons. H. J. Hilbert, President; T. H. Judd, Secretary; R. H. Pierce, Treasurer; S. A. Harrison, Manager. Out of blast since the spring of 1874.

Number of anthracite coal and coke furnaces: 3 stacks. Total number of furnaces in Wisconsin: 15 stacks.

MISSOURI.

BITUMINOUS COAL OR COKE.

Jupiter Iron Works, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873; has not yet been in operation.

Missouri Furnaces, Missouri Furnace Co., St. Louis. Two stacks, each 56 x 15, built in 1870; fuel, Connellsville coke; closed tops; total annual capacity, 33,600 net tons. Product, principally Bessemer pig iron. Brand, "Missouri." Oliver B. Filley, President; Edwin C. Cushman, Vice-President; Chas. A. McNair, Secretary; Alex. J. Leith, General Manager.

South St. Louis Iron Co., 324 North Third st., St. Louis. Two stacks, each 56 x 14, built in 1870 and 1872; fuel, Big Muddy raw coal and Connellsville coke; closed tops; total annual capacity, 33,000 net tons. Use Missouri ore. Specialty, Bessemer pig iron. Brand, "South St. Louis." John H. Maxon, President; Joseph E. Gorman, Secretary; Charles Howard, Manager.

Vulcan Iron Works, St. Louis. Three stacks: two, 60 x 14 and 60 x 15, built in 1869; one, 65 x 16, finished in 1872; closed tops; fuel, raw coal and coke; total annual capacity, 50,000 net tons. Use $\frac{3}{4}$ Iron Mountain ore and $\frac{1}{4}$ red hematite. Product, Bessemer pig iron. *See Rolling Mills.*

Number of bituminous furnaces: 8 stacks.

CHARCOAL.

Hamilton Furnace, Hamilton Iron Co., Sullivan, Franklin county. One stack, 40 x 9 $\frac{1}{2}$, built in 1873; put in blast October 22, 1873; open top; hot blast. J. H. Ricker, President; Samuel McConnell, Vice-President; J. B. Folsom, Secretary and Manager.

Irondale Furnace, E. Harrison & Co., Irondale, Washington county. Office, 941 North Second st., St. Louis. One stack, 38 x 10, built in 1859; hot blast; open top; annual capacity, 9,500 net tons. Uses Iron Mountain specular ore. Product, soft gray pig iron. Brand, "Irondale." Edwin Harrison, General Manager.

Iron Mountain Furnaces, Iron Mountain Furnace Co., Iron Mountain, St. Francois county. Two stacks, each 38 x 9 $\frac{1}{2}$, built in 1846 and 1854; combined daily capacity, 40 net tons. Edwin Harrison, President.

Maramec Iron Works, Wm. James, lessee, Maramec Iron Works, Phelps county. One stack, 32 x 9 $\frac{1}{2}$, built in 1826 and rebuilt in 1851; open top; cold blast; water-power; annual capacity, 5,000 net tons. Uses blue specular and red oxide ore mined near the furnace. Specialty, car-wheel pig iron. Brand, "Maramec." *See Bloomaries.*

Midland Furnace, Midland Blast-Furnace Co., Midland, Crawford county. One stack, 50 x 10, built in 1874-5; blown in April 10, 1875; closed top; either cold or hot blast; annual capacity, 9,000 net tons. This furnace stack is wholly built of fire-brick, 22 $\frac{1}{2}$ inches thick. Uses red hematite ore. Product, foundry pig iron. Brand, "Midland." E. C. Sterling, President; Wm. H. Lee, Secretary.

Moselle Furnace, Moselle Iron Co., Moselle, Franklin county. One stack, 39 x 9½, built in 1867; warm and hot blast; open top; annual capacity, 6,000 net tons. J. Craig Smith, managing partner, Cleveland, Ohio.

Ozark Iron Works, Wm. James, lessee, Ozark Iron Works, Phelps county. One stack, 40½ x 9½, built in 1873-4, and blown in June 10, 1874; hot blast; open top; annual capacity, 10,000 net tons. Uses blue and red hematite ore from Dent county.

Pilot Knob Furnace, Pilot Knob Iron Co., Pilot Knob, Iron county. Office, 110 Chestnut st., St. Louis. One stack, 46 x 11½, built in 1848; daily capacity, 25 net tons. Uses ½ Shephard Mountain and ¾ Pilot Knob ore. Product, principally Bessemer pig iron. Thomas Allen, President; John W. Boyd, Secretary and Treasurer; G. W. Crains, Superintendent.

Scotia Iron Furnace, Scotia Iron Co., Leesburg, Crawford county. One stack, 40 x 9½, built in 1870; hot blast; open top; annual capacity, 12,000 net tons. President and Treasurer, Robert Anderson; Vice-President, Thomas Howard; Secretary, E. R. Lackland; Manager, Thomas J. Scott.

Number of charcoal furnaces: 10 stacks. Total number of furnaces in Missouri: 18 stacks.

OREGON.

Oswego Furnace, Oswego Iron Co., Oswego, Clackamas county. One stack, 32 x 10, built in 1866; open top; hot blast; water-power; fuel, charcoal; annual capacity, 4,000 net tons. President, S. H. Brown; Secretary and Manager, E. W. Crichton. Brand, "Oregon."

Number of furnaces in Oregon: 1 charcoal stack.

UTAH TERRITORY.

CHARCOAL.

Great Western Iron Works, Thomas Taylor, Salt Lake City. Works at Iron City, Iron county. Two stacks, both very small, built in 1873-5.

Laura May Furnace, Equitable Iron and Coal Co., Ogden City. One stack, 45 x 12, built in 1875-8; hot or cold blast; water-power; annual capacity, 7,000 net tons. Uses hematite and magnetic ores mined within 10 miles of the furnace. James D. Case, Manager. *See Rolling Mills.*

Number of furnaces in Utah: 3 charcoal stacks.

Total number of furnaces in the United States: 698 completed stacks, and 7 building.

RECENTLY ABANDONED FURNACES.

NOTE.—Some of the furnaces named in this list have been standing for many years with good machinery, and at some time may again be put in operation.

NEW HAMPSHIRE.

New Hampshire Iron Co., Franconia, Grafton county. Charcoal. Abandoned in 1865.

VERMONT.

Shaftsbury Iron Works, South Shaftsbury, Bennington county. Built in 1863. Charcoal. Last blast ended in March, 1876, under Geo. W. Swett & Co., lessees, of Troy, N. Y.

NEW YORK.

CHARCOAL.

Cooper's Falls Furnace, Union Iron Co. (of Buffalo), De Kalb, St. Lawrence county. Built in 1864; abandoned in 1868.

Dutchess County Iron Works, N. S. Simpkins, Jr., 32 Pine st., New York. Furnace at Dover, Dutchess county. Built in 1834. Abandoned in 1870.

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

Myers Steel and Iron Co., Clifton, St. Lawrence county. Abandoned in 1870.

Rossie Iron Works, Ogdensburg, St. Lawrence county. Built in 1843; abandoned in 1868.

NEW JERSEY.

Wawayanda Furnace, Wawayanda, Sussex county. Built in 1845. Thomas Iron Co., owner, Hokendauqua, Pa.

PENNSYLVANIA.

ANTHRACITE.

Lucinda Furnace, Norristown, Montgomery county. Built in 1856. Made its last blast in 1875. Owned by J. H. Boone and Jonathan Hefle, of Reading.

Shamokin Furnace, David Longenecker, Shamokin, Northumberland county. Built in 1841; abandoned in 1869.

BITUMINOUS COAL AND COKE.

Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871-2; torn down in 1872, and not rebuilt.

- Juniata Furnace, Williamsburg Manufacturing Co., Williamsburg, Blair county. One stack, 28 x 8½, built in 1857. Used as a lime kiln in 1877.
- Lawrence Furnace, Foltz & Jordan, New Castle, Lawrence county. One stack, 35 x 8½, built in 1846; fuel, coke and charcoal; open top. Abandoned in 1873.
- Middlesex Furnace, West Middlesex, Mercer county. One stack, 45 x 12, built about 1855. Abandoned in 1875.
- Monticello Furnace, William Acheson, Monticello, Armstrong county. One stack, 53 x 11½, built in 1859. Abandoned in 1876.
- Sligo Furnace, Wetter & Lyon, Sligo, Clarion county. One stack, 32 x 9, built in 1845; torn down in 1873 to be rebuilt, but work progressed no further than the foundation.

CHARCOAL.

- Augusta Furnace, Harrisburg and Potomac Railroad Company, Daniel V. Ahl, President, Newville, Cumberland county. Furnace near Shippenburg. May be rebuilt when business revives.
- Caledonia Furnace, Estate of Thaddeus Stevens, Graeffenberg, Adams county. One stack, 33 x 8, built in 1837. Furnace in Franklin county.
- Huntingdon Furnace, G. & J. H. Shoenberger, Spruce Creek, Huntingdon county. Built in 1796. Abandoned in 1870.
- Manada Furnace, Grubbs & Bland, Swatara Station, Dauphin county. One stack, 31 x 8, built in 1836; abandoned in 1874.
- Mary Ann Furnace, Horatio Trexler, Long Swamp, Berks county. Built in 1797. Out of blast since 1869.
- Mill Creek Furnace, E. A. Green & Co., Mill Creek, Huntingdon county. Built in 1838. Out of blast since 1869.
- Montebello Furnace, Fisher & Morgan, Duncannon, Perry county. One stack, 42 x 12; water-power. Abandoned for several years.
- Mount Penn Furnace, George Shalter, Reading, Berks county. One stack, 30 x 8½, built in 1830. Made its last blast in 1874.
- Rock Hill Furnace, Rock Hill Iron and Coal Co., Orbisonia, Huntingdon county. Built in 1830. Abandoned in 1873.
- Spring Hill Furnace, Fairchance Iron Co., Smithfield, Fayette county. One stack, 35 x 9, built in 1805, rebuilt in 1854, and repaired in 1873.

NORTH CAROLINA.

CHARCOAL.

- Long Creek Furnace, Admiral Wilkes, High Shoals, Gaston county. One stack; daily capacity, 4 tons.
- Maratoc Iron Works, Danbury, Stokes county. Owned by parties in Richmond, Va. Though ore is plenty, this furnace has not been in blast for many years.

COKE.

Gulf Furnace, S. H. Wiley, Salisbury. Works at Ore Hill, Chatham county. One stack, begun in 1873, but not completed.

ALABAMA.

CHARCOAL.

Hale & Murdoch, Columbus, Miss. Furnace in Sanford county, Alabama. One stack, built in 1861, abandoned in 1870; cause, 25 miles from railroad. The ore found here is brown hematite, yielding from 60 to 67 per cent.

McKee Furnace, Jefferson Iron Co., Irondale Furnace P. O., Jefferson county. One stack, 46 x 10½; hot blast.

KENTUCKY.

CHARCOAL.

Belmont Furnace, Belmont and Nelson Iron Co., Levi Brady, Manager, Belmont Furnace, Bullitt county. One stack, 36 x 9, built in 1844; daily capacity, 12 net tons; not in blast since 1870.

Buena Vista Furnace, Means & Co., Ashland, Boyd county. One stack, 40 x 10, built in 1848; hot blast; open top; dismantled in 1876.

Mammoth Furnace, Morris, Machen & Co., Eddyville, Lyon county. One stack, 31 x 9, built in 1845; daily capacity, 16 net tons; not in blast for several years.

Nelson Furnace, Belmont and Nelson Iron Co., Nelson Furnace, Nelson county. One stack, 32 x 9, built in 1834; daily capacity, 11 net tons; not in blast since 1871.

BITUMINOUS COAL.

Kenton Furnace, Gaylord Iron and Pipe Co., Cincinnati, O. Works at Newport, Campbell county, Ky. One stack, 60 x 16, built in 1869; annual capacity, 14,000 net tons; closed top. Abandoned in 1877 and machinery removed to the Hocking Valley, Ohio, by the Crafts Iron Co.

TENNESSEE.

Great Western Furnace, Dover, Stewart county. Built in 1854; recently sold to new parties with a slight probability that it may be repaired and started up.

INDIANA.

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

OHIO.

CHARCOAL.

Jackson Furnace, Estate of L. P. N. Smith, Sciotoville, Scioto county.

Furnace in Jackson county. One stack, 36 x 10½, built in 1839.

Zanesville Furnace, Ohio Iron Co., Zanesville, Muskingum county.

BITUMINOUS COAL AND COKE.

Porter Furnace, Jonathan Warner, Mineral Ridge, Trumbull county.

One stack, 45 x 13, built in 1860. Made its last blast in 1873.

Warren Furnace, Wm. Richards & Sons, Warren, Trumbull county.

One stack, 50 x 14, built in 1870; burnt in 1878.

MICHIGAN.

CHARCOAL.

Bancroft Furnace, Bancroft Iron Co., Marquette, Marquette county.

One stack, 40 x 9, built in 1859, and rebuilt in 1871; water-power.

Bay Furnaces, Bay Furnace Co., Onota, Schoolcraft county. Two stacks: one, 45 x 9, built in 1870; the other, 45 x 9½, completed and put in blast in December, 1872; hot blast; total annual capacity, 20,160 net tons. Burnt in 1877. E. P. Williams, Secretary, Marquette.

Collins Furnace, Collins Iron Co., Marquette, Marquette county. Built in 1858; abandoned in 1873.

Harvey Furnace, Northern Iron Co., Harvey, Marquette county. One stack, 50 x 13½, built in 1860 and rebuilt in 1873.

Ishpeming Furnace, Lake Superior Iron Co., Marquette. Furnace at Ishpeming. One stack, 43 x 9, built in 1872; ran on peat and charcoal.

Michigan Iron Co., Marquette. Furnaces at Clarksburgh, Marquette county. Two stacks: Greenwood, 42 x 9, built in 1865; and Michigan, 42 x 9, built in 1867; hot blast.

Morgan Furnace, Morgan Iron Co., Marquette. Furnace at Morgan, Marquette county. Two stacks: Morgan, 45 x 9, built in 1863; Champion, 45 x 9, built in 1867 and burnt in 1874.

MISSOURI.

Osage Furnace, J. A. Quealy, Osage Iron Works, Camden county. One stack, 38 x 9, built in 1873, and in blast a very short time.

MINNESOTA.

Duluth Furnace, Duluth, St. Louis county. One stack, 45 x 9½, commenced in 1873, but not finished; would require considerable outlay to finish it. Held for sale in its present condition by the creditors, represented by Robinson, Rea & Co., Pittsburgh.

ROLLING MILLS.

MAINE.

Pembroke Iron Works, Pembroke Iron Co., Pembroke, Washington county. Agents, Wm. E. Coffin & Co., Boston. Built prior to 1854; 9 double puddling furnaces, 1 single and 3 double heating furnaces, 30 nail machines, and 4 trains of rolls (one 8, one 14, and 2 16-inch); steam and water power; product, bars, bands, nails, and skelp iron; annual capacity, 10,000 net tons. *See Franconia Iron and Steel Works, Massachusetts.*

Portland Rolling Mill, Portland Rolling Mill Co., Portland. Built in 1866; 4 double puddling furnaces, 8 heating furnaces, and 2 trains of rolls; product, rails and bar iron; annual capacity, 15,000 net tons. James W. Leavitt, Treasurer.

Number of mills in Maine: 2, one of which rolls rails.

NEW HAMPSHIRE.

Nashua Iron and Steel Co., Nashua, Hillsboro' county. M. A. Herrick, Treasurer, Boston, Mass. Built in 1848; steel-tire mill added in 1868; 19 heating furnaces, 1 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 plate, steel plates, and steel locomotive and car tires, bar steel and bar iron, hardened-steel-tired car, truck, and tender wheels. Brand, an Indian head. Alfred Sweeney, Superintendent, Nashua.

Number of mills in New Hampshire: 1.

VERMONT.

St. Albans Iron and Steel Works, St. Albans Iron and Steel Co., St. Albans, Franklin county. Put in operation May 10, 1873; 2 double and 6 single puddling furnaces, 8 heating furnaces, 1 hammer, and 2 trains of rolls (one 19 and one 21-inch); one 10-ton open-hearth steel furnace added in 1877, and put in operation in December; product, silicon-steel-top rails rerolled, and new iron and steel rails; annual capacity, 20,000 net tons. Philo Remington, President; George G. Smith, Secretary; A. J. Gustin, Superintendent.

Number of mills in Vermont: 1 rail mill.

MASSACHUSETTS.

Bay State Iron Works, Bay State Iron Co., Boston, Suffolk county. Rail and puddle mill built in 1847; 16 double puddling furnaces, 13 heating furnaces, and 4 trains of rolls. No. 1 plate mill built in 1863; 2 trains of rolls, 5 heating furnaces and 1 hammer. No. 2 plate mill built in 1873, first put in operation January 1, 1874; 6 heating furnaces, 1 Siemens open-hearth steel furnace, and 4 trains of rolls. Product, rails, homogeneous steel plates, and flange, boiler, and tank plates; annual capacity, rails, 22,000 net tons; plates, mill No. 1, 4,500 tons, and No. 2, 6,000 tons. Trade-mark, "Bay State." J. Avery Richards, Treasurer. *See New York Furnaces.*

Boston Rolling Mills, 17 Batterymarch st., Boston. Works in Cambridgeport. Built in 1868; 5 heating furnaces, 1 horse-shoe machine, and 3 trains of rolls; product, merchant bar and shafting iron to 2½ inches in diameter, frog, switch, and scythe-back steel, axe iron, re-rolled Norway and Swedish shapes, bolt, nail, rivet and wire rods, scrap wire and rivet rods, scrap rods, scrolls, tires, horse-shoe iron, and hand and machine made horse-shoes. Stamp for best refined is "B. R. M." Special stamps are used on other kinds of iron. W. R. Ellis, Treasurer.

Bridgewater Iron Co., 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 and tack plate, sheet zinc and sheet copper, and miscellaneous iron and steel forgings; use scrap iron and scrap steel exclusively; product of rolled iron, about 6,000 net tons yearly. Nahum Stetson, Treasurer.

Danvers Iron Works, R. W. Love, Danversport, Essex county. Built in 1831; 3 heating furnaces and 2 trains of rolls; product, bars and rods; annual capacity, 3,000 net tons.

East Bridgewater Iron Co., Rogers & Sheldon, 81 Water st., Boston. Works at East Bridgewater, Plymouth county. Built in 1837; 2 single puddling furnaces, 4 heating furnaces, 1 train of rolls, 26 nail machines, and 1 hammer; water-power; product, cut nails, clinch nails, tack plate and shovel plate; annual capacity, 2,500 net tons.

Fall River Iron Works, Fall River Iron Works Co., Fall River, Bristol county. Built in 1822 and rebuilt in 1842; 5 buildings: rolling mill, nail mill, foundry, boiler works and machine shop; 7 double and 4 single puddling furnaces, 10 heating furnaces, 105 nail machines, 1 hammer, and 9 trains of rolls (two 8, three 9, and four 18-inch); product, nails, hoops, bands, and merchant bar iron to 2 inches round, square and flat; annual capacity, 11,000 net tons. Jefferson Borden, President; R. C. Brown, Agent and Treasurer.

- Franconia Iron and Steel Works, Wareham, Plymouth county. Owned by Wm. E. Coffin & Co., Boston. Built in 1866; 1 single and 5 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron, all kinds and sizes. *See Pembroke Iron Works, Maine.*
- Globe Nail Co., Station "A," Boston. Built in 1877; 1 heating furnace and one 12-inch train of rolls; product, horse-nail plate; annual capacity, 3,000 net tons; use Swedish iron. President, John Gardner; Secretary, W. B. Crocker; Treasurer, T. H. Fuller; Superintendent, W. W. Miner.
- Gosnold Mills, New Bedford, Bristol county. Built in 1857; 7 heating furnaces and 5 trains of rolls; product, hoops, bands, scrolls, tires, rods, and horse-shoe and hame iron; annual capacity, single turn, 4,500 net tons. Brand, "Gosnold." The iron is made from best wrought scrap and charcoal ore blooms. Leading products are hoops and wire rods. Joseph H. Cornell, President and Treasurer; John A. Bates, Secretary; Henry Howard, Superintendent.
- Kinsley Iron and Machine Works, Kinsley Iron and Machine Co., Canton, Norfolk county. Built in 1788, and incorporated in 1855; burned down January 14, 1875, and rebuilt, enlarged, and put in operation by May 24, 1875; 1 single and 4 double puddling and 6 heating furnaces, and 3 trains of rolls (one 8, one 14, and one 18-inch), 1 busheling and 2 scrap furnaces, and 8 hammers; steam and water power; product, bar iron, shapes, tack and shovel plate, and railroad supplies; annual capacity, 10,000 net tons. Oliver Ames, President; Edw. R. Eager, Treasurer; Frank M. Ames, Agent.
- Mount Hope Iron Works, Mount Hope Iron Co., Somerset, Bristol county. Built in 1875; 1 single and 3 double puddling furnaces, 5 heating furnaces, 65 nail machines, and two 18-inch trains of rolls; product, nails, tack plate, skelp iron, shovel plate, etc.; annual capacity, 4,500 net tons. J. M. Leonard, Treasurer.
- Newton Iron Works, J. B. Newell, lessee, Newton Upper Falls, Middlesex county. Built about 1800; 2 heating furnaces and 1 train of rolls; water-power; product, horse-nail rods, and shapes for machinery and gun barrels; annual capacity, 2,500 net tons.
- Norway Iron Works, Naylor & Co., Boston. Office, 6 Oliver st. Works at 363 Dorchester avenue, South Boston. Built in 1854; 12 single puddling furnaces, 11 heating furnaces, 8 trains of rolls, 3 Siemens open-hearth steel furnaces, and 3 hammers; product, flat, round and square iron, and spring, tire, toe calk, and sleigh-shoe steel; annual capacity, 18,000 net tons. Brands, "Benzon," "Vasa," "Malar," "Norway," "N. I. W.," and a five-point star. *See Charcoal Furnace in Vermont.*

Old Colony Iron Co., Taunton, Bristol county. Built in 1825; 5 double and 6 single puddling furnaces, 9 heating furnaces, 95 nail machines, 5 trains of rolls, and 5 hammers; steam and water power; product, nails, tack plates, and shovels.

Parker Mills, Wareham, Plymouth county. Built in 1815; 6 double puddling furnaces, 2 heating furnaces, 75 nail machines, 2 trains of rolls, and 1 hammer; water-power; product, nails.

Robinson Iron Co., Plymouth, Plymouth county. Built about 1800; 1 double puddling furnace, 6 heating furnaces, 2 trains of rolls, 18 nail machines, and 1 squeezer; steam and water power; product, nails and tacks; average yearly production, 3,000 net tons. A. D. Robinson, President, and James Millar, Treasurer.

Somerset Iron Works, Somerset Iron Co., Somerset, Bristol county. Built in 1855; 7 double puddling furnaces, 5 heating furnaces, 72 nail machines, and 2 12-inch trains of rolls; product, nails, shovel plate, nail machines, castings, mill machinery, hoisting engines, etc.; annual capacity of rolled iron, 5,000 net tons. Formerly, Mount Hope Iron Works. O. A. Washburn, Jr., Treasurer.

Tisdale Nail Works, Agawam Iron Co., East Wareham, Plymouth county. Built in 1836; 5 double puddling furnaces, 7 heating furnaces, 3 trains of rolls, and 70 nail machines; water-power; product, bar iron, nails, and tack plate; annual capacity, 70,000 kegs of nails. This includes Glen Rolling Mill, belonging to the same property, situated $2\frac{1}{2}$ miles from the Tisdale Works. Wm. T. Cobb, Agent.

Tremont Nail Works, Tremont Nail Co., West Wareham, Plymouth county. Built about 1820; 6 double puddling furnaces, 1 Siemens gas and 3 coal heating furnaces, 4 trains of rolls, and 75 nail machines; steam and water power; product, washers, nails, tacks, brads, and small rounds and squares; annual capacity, 6,000 net tons. Nails and iron are branded "Gas Worked." Horace P. Tobey, Treasurer.

United States Navy Yard, Charlestown, Middlesex county. Mill built in 1868; 42 forge fires, 6 heating furnaces, 8 hammers, and two trains of rolls (one 18 and one 10-inch); product, bar iron; annual capacity, 3,000 net tons, single turn.

Wareham Nail Co., South Wareham, Plymouth county. Built in 1836; 1 double puddling furnace, 3 heating furnaces, 32 nail machines, and 2 trains of rolls; steam and water power; product, nails; annual capacity, 2,500 net tons.

Washburn and Moen Manufacturing Co., Worcester, Worcester county. Two mills: Quinsigamond Rolling Mill; built in 1846; 5 heating furnaces and 2 trains of rolls; product, iron and steel screw, rivet, and wire rods; annual capacity, 5,000 net tons. Grove Mill; built in 1868;

1 heating furnace and 1 train of rolls; product, patent continuous wire rods of long lengths and small size for telegraph and rope wire; annual capacity, 10,000 net tons. Philip L. Moen, President and Treasurer; Chas. F. Washburn, Secretary; Chas. H. Morgan, Superintendent.

Washburn Iron Co., Worcester. Built in 1857; 1 single and 3 double puddling furnaces, 9 heating furnaces, 2 hammers, and 2 trains of rolls (one 3-high, 18-inch rail train, and one 2-high, 20-inch roughing train); product, rerolled rails; annual capacity, 18,000 net tons. Edward L. Davis, Treasurer; Joseph E. Davis, Secretary; Geo. W. Gill, Manager.

Weymouth Iron Co., East Weymouth, Norfolk county. Built in 1836; 6 double puddling furnaces, 5 heating furnaces, 82 nail machines, and 3 trains of rolls; steam and water power; product, nails and spikes; annual capacity, 5,600 net tons. Isaac Pratt, Jr., President, and Nahum Stetson, Treasurer and Manager.

Number of mills in Massachusetts: 24; 2 of which make rails.

RHODE ISLAND.

Providence Iron Co., 69 India st., Providence. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 5 trains of rolls, 66 nail machines, and 2 squeezers; product, cut nails, spikes, patent wrought nails, and wire rods; annual capacity, 7,200 net tons; average yearly production, 6,500 tons. Nails branded, "Parker Mills."

Rhode Island Horse Shoe Works, Rhode Island Horse Shoe Co., Providence. Works at Valley Falls, 7 miles from Providence. Built in 1857 and 1874; 6 scrap and 4 heating furnaces, 6 trains of rolls, and 16 horse-shoe machines; product, bars for the horse-shoe machines; annual capacity, 10,000 net tons, single turn. Brand, "Perkins' United States Standard Horse and Mule Shoes." F. W. Carpenter, President; C. H. Perkins, Agent; R. W. Comstock, Secretary.

Number of mills in Rhode Island: 2.

CONNECTICUT.

Aetna Nut Co., Southington, Hartford county. Built in 1873; 1 single puddling furnace, 3 scrap and 2 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 18-inch); product, squares, rounds, nut shapes, bolt rods, and butt iron; annual capacity, 5,500 net tons.

Cold Spring Iron Works, Mitchell, Bros. & Co., Norwich, New London county. Built in 1845; 3 heating furnaces and 2 trains of rolls; product, rods and bands; annual capacity, 1,700 net tons.

Greenwich Iron Works, Pettes, Ayres & Davenport, Mianus, Fairfield county. Built in 1836; 2 single puddling furnaces, 2 heating furnaces,

and 3 trains of rolls; water-power; product, round and square rods, $\frac{1}{4}$ to $\frac{3}{8}$; annual capacity, 2,000 net tons. Idle since Jan. 1, 1875.

Iron and Steel Works, Derby, New Haven county. Built in 1843; 2 busheling furnaces, 1 single puddling furnace, 5 heating furnaces, 5 trains of rolls and 5 hammers; steam and water power; product, carriage springs, axles, all sizes merchant bar iron, and wire rods; annual capacity, 7,000 net tons bars, 1,500 tons axles, and 800 tons springs. Idle since March, 1877.

New Haven Rolling Mill, New Haven Rolling Mill Co., New Haven. Completed in August, 1871; 5 heating furnaces and 2 trains of rolls (one 8 and one 18-inch); product, bar iron, small rounds and flats, and horse-shoe iron; use only scrap iron; annual capacity, 2,200 net tons. H. M. Welch, President; E. S. Wheeler, Secretary; Pierce N. Welch, Treasurer; C. S. Poronto, Manager.

Stillwater Iron Works, Davenport & Ayres, Stamford, Fairfield county. Built in 1835; 1 single puddling furnace, 2 heating furnaces, and 3 trains of rolls; steam and water-power; product, round and square rods, $\frac{1}{4}$ to $\frac{3}{8}$; annual capacity, 2,000 net tons.

Thames Iron Works, Norwich, New London county. Built in 1863; 3 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 squeezer; product, common bar iron made from scrap; spike rods a specialty; also "Thames Tenacious," an extremely fibrous iron, made from pig, and very similar to Norway iron; annual capacity, 2,500 net tons. T. Raymond, President; James Greenwood, Secretary and Treasurer.

Number of mills in Connecticut: 7.

NEW YORK.

Albany and Rensselaer Iron and Steel Co., Troy, Rensselaer county. Comprises two establishments which were consolidated in 1875: Albany Iron Works; established in 1819; 2 double and 32 single puddling furnaces, 13 heating furnaces, 8 trains of rolls, 1 steam and 4 trip hammers, 3 horse-shoe machines, 45 nail machines, 2 bolt, 4 rivet, 2 nut, and 5 spike machines; steam and water power; product, bars, angles, car axles, bands, finger-bars, steel and iron horse-shoes, crow-bars, railroad and boat spikes, fish plates, bolts and nuts, cut nails, and boiler rivets; annual capacity, 20,000 net tons. Rensselaer Iron Works; puddle, forge, and top-and-bottom mill built in 1846; three-high iron and steel rail mill and merchant mill built in 1866 and 1867; new merchant mill built in 1877 and 1878; 2 puddling furnaces, 20 heating furnaces, 8 trains of rolls, and 2 steam hammers; product, rails, bar iron, steel shapes and sheets, and special steels; an-

nual capacity, 65,000 net tons; capacity of merchant mill, 10,000 tons. Bessemer steel works; built in 1864; made their first blow on Feb. 15, 1865; 2 converters, each of $6\frac{3}{4}$ gross tons capacity; 3 cupolas and 2 spiegel furnaces; annual capacity, 80,000 net tons ingots; blooming department contains 5 heating furnaces, and an adjustable train of $31\frac{1}{2}$ inch rolls; capacity to roll full product of converting department; foundry with one cupola; steam-power with auxiliary water-wheel. Erastus Corning, President; Chester Griswold, Vice-President, 56 Broadway, New York; Selden E. Marvin, Secretary and Treasurer; James E. Walker, General Manager; Robert W. Hunt, General Superintendent. *See Furnaces.*

Auburn Iron Works, Tuttle & Reed, Auburn, Cayuga county. Built in 1853; 1 heating furnace, one 9-inch train of rolls, and 1 Kirk steam hammer; use scrap iron only; product, merchant bar of all sizes and shapes; annual capacity, 1,800 net tons.

Buffalo Iron and Nail Works, Pratt & Co., Buffalo, Erie county. Built in 1847; destroyed by fire and rebuilt in 1865; 25 single puddling furnaces, 8 heating furnaces, 40 nail and spike machines, 8 trains of rolls, and 1 hammer; product, bar, angle and plate iron, cut nails, boat and railroad spikes, rivets, and street rails. *See Furnaces.*

Burden Iron Works, H. Burden & Sons, Troy. Founded in 1813; 9 double and 42 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, 42,000 net tons. Brands of merchant iron, "H. B. & S." and "Burden Best." *See Furnaces.*

Cohoes Rolling Mill, Morrison, Colwell & Page, 259 River st., Troy. Works at Cohoes, Albany county. Built in 1864; 6 double puddling furnaces, 1 scrap and 4 heating furnaces, and 3 trains of rolls; water-power; product, band and bar iron, and patent punched axe polls; specialty, high grade iron for edge tools and butt hinges; annual capacity, 5,000 net tons.

Delano Iron Works, Delano Iron Co., Syracuse, Onondaga county. Built in 1865; 5 double puddling furnaces, 9 heating furnaces, and 3 trains of rolls (one 9 and two 19-inch); product, rails, fish plates, railroad spikes, and merchant iron; annual capacity, rails, 16,000 net tons, merchant iron, 4,000 tons. Irving T. Ballard, Secretary. Idle since 1875.

Dutchess Iron Co. Limited, Poughkeepsie. Built in 1873; 6 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, merchant bar iron, axles, spikes, chairs, fish bars and bolts, car forgings, bridge bolts and irons, and railway materials generally; annual capa-

city, 8,000 net tons. Thomas Douglass, Secretary and acting President; Edwin Marshall, Treasurer.

Elmira Iron and Steel Rolling Mills, Elmira Iron and Steel Rolling Mill Co., Elmira, Chemung county. Rail mill built in 1860; puddle mill rebuilt in 1874 and 1877; 11 single and 3 double puddling furnaces, 7 heating furnaces, 2 trains of rolls, 1 hammer and 1 rotary squeezer. Bar mill added in 1865; 6 heating furnaces, 1 scrap furnace, 1 hammer, and 5 trains of rolls and a "universal" plate mill. Product, silicon steel rails, merchant bar iron, hoops, bands, angle, and plate iron; annual capacity of rails, 18,000 net tons; annual capacity of bar mill, 10,000 tons. H. W. Rathbone, President; Jesse L. Cooley, Secretary and Treasurer. *See Furnaces.*

Keeseville Rolling Mill, Ausable Horse Nail Co., Keeseville, Clinton county. Built in 1869; 2 heating furnaces, 1 train of rolls, and 1 hammer; water-power; product, nail rods only; annual capacity, 2,000 net tons. The nail rods are all worked into horse nails by the same Company. E. Kingsland, President; N. Kingsland, Vice-President; J. R. Romeyn and Abraham Bussing, Secretaries; E. K. Baber, Treasurer.

Lake Champlain Nail Works, owned by State of New York, State Prison, Dannemora, Clinton county. Built in 1853; 48 nail machines and 1 train of rolls; product, cut nails, bar iron, and horse-shoe iron. G. Moffitt, Agent. *See Forges.*

Lockport Iron Co., Lockport, Niagara county. Built in 1870; 2 heating furnaces and 2 trains of rolls; water-power; product, hoops, bands, wire rods, horse-shoe iron, rounds and squares; annual capacity, 3,000 net tons. Use scrap iron only. B. H. Fletcher, Superintendent.

Peru Steel and Iron Co., 91 Reade st., New York. Works at Clintonville, Clinton county. Built in 1824; 2 heating furnaces and 3 trains of rolls; water-power; product, bar iron, known as "Peru" iron, and largely used for conversion into best grades of cast steel; annual capacity, 4,500 net tons. Charles Bliven, President; F. J. Dominick, Vice-President; Wm. Henry Gunther, Treasurer. *See Forges.*

Plattsburgh Iron Works, C. F. Norton, Plattsburgh, Clinton county. Built in 1878; 1 heating furnace, 2 sets 16-inch rolls, 2 sets 9-inch rolls, and 1 set planishing rolls; product, horse-nail rods, tack plate, etc. *See Charcoal Furnaces. See Forges. See Bloomaries.*

Rome Iron Works, Rome Iron Works Co., Rome. Built in 1866; 7 double puddling and 8 heating furnaces, and 2 trains of rolls (one 18 and one 20-inch); have built 2 of Gleason's patent self-feeding nail machines, but have not completed their nail plant; product, rails and nails; annual capacity, 22,000 net tons of rails. Edward Huntington, President; J. S. Haselton, Treasurer; T. G. Nock, Superintendent.

Rome Merchant Iron Mill, Rome Merchant Iron Co., Rome. Built in 1869; 1 double and 4 single puddling furnaces, 3 heating furnaces, 1 hammer and 2 trains of rolls (one 9 and one 18-inch); product, merchant iron; annual capacity, 5,000 net tons. E. B. Armstrong, President; J. B. Jervis, Secretary; A. R. Rand, Treasurer; John Groves, Superintendent.

Sable Iron Works, J. & J. Rogers Iron Co., Ausable Forks, Essex county, and Black Brook, Clinton county. Built in 1834; 22 forge and blooming fires, 2 heating furnaces, 2 trains of rolls (one 12 and one 8-inch), 10 nail machines, and five 6-ton hammers; water-power; product, charcoal blooms and bars for conversion into cast steel, Peru horse-shoe iron, round and square iron, and Sable cut nails; annual capacity, 7,000 net tons. Brands, Peru iron, "Rogers," or R in a circle. John Rogers, President; H. D. Graves, Vice-President; H. W. Stetson, Secretary. *See Forges.*

Samsondale Iron Works, John Peck, Haverstraw, Rockland county. Built in 1832; 4 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 8 and one 16-inch bar, and one 16 and one 20-inch sheet); steam and water power; product, rods, bars, and sheet iron; annual capacity, 3,000 net tons. Idle since 1875.

Skaneateles Iron Works, Louis F. Powell, Syracuse. Works at Skaneateles Falls, Onondaga county. Built in 1868; 2 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 9 and one 16-inch); water-power; product, bars only; annual capacity, 2,500 net tons. Mill held for sale.

Spuyten Duyvil Rolling Mill, Spuyten Duyvil Rolling Mill Co., Spuyten Duyvil, New York City. Rail mill built in 1863; 10 heating and 4 double puddling furnaces and 2 trains of 3-high, 18-inch rolls. Bar and guide mill added in 1872; 4 heating furnaces, and 2 trains of rolls (one 9 and one 16-inch). Product, rails, fish plates, with bolts and nuts complete, railroad and dock spikes, rivets, and all sizes of merchant and guide mill iron; annual capacity, 20,000 net tons. Wm. Lewis, Superintendent. Idle for several years.

Star Iron Works, Bowen & Signor, Saranac, Clinton county. Built in 1878; 3 trains of rolls; product, iron for nail rods, bolts, rivets, etc., made from blooms. *See Forges.*

Syracuse Iron Works, Syracuse. Built in 1861; 1 single and 4 double puddling and 5 heating furnaces, Hall's tilting and revolving mechanical puddler, 3 trains of rolls (one 6, one 9, and one 16-inch), and 2 steam hammers; product, bar, wire rod, band, and hoop iron, railroad and boat spikes, fish bolts, and horse-shoe and bridge iron; have lately added the manufacture of horse-shoes (Farmer's patent) and

cotton ties (Wright's patent) and steel tire and wire rods; annual capacity, 6,000 net tons. R. N. Gere, President, and Charles E. Hubbell, Secretary and Treasurer.

Troy Wire Manufacturing Co., Howell, Iler, Probert & Co., Troy. Built in 1874; 1 heating furnace, one 6-inch train of rolls, and 6 wire-drawing blocks; water-power; product, wire from No. 0 to 36, small ovals, half ovals, rounds, etc., and $\frac{3}{8}$ to one-inch hoop iron; annual capacity, 1,000 net tons. Mill idle for several years.

Ulster Iron Works, Tuckerman, Mulligan & Co., Saugerties, Ulster county. Built in 1827; 1 single and 8 double puddling furnaces, 4 heating furnaces, 6 trains of rolls, and 1 hammer; water-power; product, bar, rod, and hoop iron; annual capacity, 6,700 net tons. Iron called "Ulster" iron.

Union Iron Works, Union Iron Co., Buffalo, Erie county. Built in 1862, and enlarged in 1864, 1865, and 1874; 16 double puddling furnaces, 18 heating furnaces, and 6 trains of rolls (one 8, one 12, one 19, two 21, and one 31-inch), all 3-high; product, rails, beams, channels, angles, shafting, bars, and plates; annual capacity, 35,000 net tons. A. Pardee, President, 303 Walnut st., Philadelphia; E. P. Wilbur, Vice-President, South Bethlehem, Pa.; George Beals, Treasurer, Buffalo; T. Guilford Smith, Secretary, Buffalo; James Jenkins, Superintendent. *See Furnaces.*

Number of mills in New York: 24. Of these, 7 roll rails, 1 making street rails only.

NEW JERSEY.

American Sheet Iron Works, McClees & Co., Phillipsburg, Warren county. Office, 52 Cliff st., New York. Built in 1867, and enlarged in 1870 and 1873; 2 double puddling furnaces, 1 heating furnace, 2 sheet finishing furnaces, 2 annealing furnaces, 4 trains of 22-inch rolls, and 1 hammer; product, black and galvanized sheet iron; galvanizing works, 51 to 57 Little 12th st., New York; annual capacity, 2,000 net tons. J. A. Robinson, Superintendent. *See Bloomaries.*

Bergen Iron Works, Jersey City, owned by Edward Samuel, 332 Walnut st., Philadelphia. Built in 1852 and rebuilt in 1870; 3 heating furnaces, 1 train of rolls, and 1 hammer; product, blooms and boiler plates; annual capacity, 2,000 net tons. The blooms were made in sinking fires, and were commercially known as "sunken scrap blooms;" the plates were made from muck bars and these blooms. Specialty, "Excelsior" XX fire-box iron. Not in operation since 1874.

Boonton Iron Works, Estate of J. Cowper Lord, Boonton, Morris county. Agents, Fuller Bros. & Co., 135, 137 & 139 Greenwich st., or P. O. Box 2,068, New York. Built in 1825; 12 double puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 150 nail machines; steam and water

power; product, nails, spikes, nuts and washers; annual capacity, 300,000 kegs of nails. Idle since June, 1876. *See Furnaces.*

Cumberland Nail and Iron Co., 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 84 nail machines; steam and water power; product, nails and gas tube; annual capacity, 10,000 net tons. Charles Richardson, President, Philadelphia; Robert J. Buck, Vice-President, Bridgeton, N. J.; William Stokes, Secretary and Treasurer, Philadelphia; R. J. and C. J. Buck, Managers, Bridgeton, N. J.

Delaware Rolling Mill, Delaware Rolling Mill Co., Phillipsburg, Warren county. One single and 3 double puddling furnaces, 2 heating furnaces, 2 trains of rolls (one 9 and one 16-inch), and 3 hammers; product, bar and guide iron, wagon and carriage axles; annual capacity, 3,500 net tons merchant iron. John Tindall, President, Easton, Pa.; John Shouse, Treasurer; P. H. Pursell, Secretary.

Dover Rolling Mill, Dover, Morris county. Built about 1770; 1 double and 3 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 18-inch); water-power; product, puddled bar, merchant bar, spikes, bolts and rivets, and horse-shoe iron; annual capacity, 2,800 net tons merchant bar. Idle for several years.

Elizabeth Iron Works, E. G. Brown, Elizabeth, Union county. Four heating furnaces, and 2 trains of rolls (one 9 and one 16-inch); product, bar and angle iron; annual capacity, 5,000 net tons. Not in operation since 1873.

Jersey City Spike and Bolt Works, W. Ames & Co., Jersey City, Hudson county. Built in 1859; 2 heating furnaces and 1 train of rolls; product, spikes, splice joints, bolts, rivets, and round, flat, and square bar iron; annual capacity, 3,500 net tons. Use scrap iron only.

John A. Roebling's Sons Company, Trenton. Old mill built in 1852, new mill in 1873; 4 heating furnaces, 4 trains of rolls, 8 charcoal bloom fires, and one 3-ton steam hammer; product, wire rope and merchant rods; annual capacity, 9,000 net tons. F. W. Roebling, Treasurer.

New Jersey Steel and Iron Co., Trenton, Mercer county. Built in 1845; 14 double puddling and 13 heating furnaces, 7 trains of rolls, 1 open-hearth Martin steel furnace, and 2 hammers; steam and water power; product, iron and steel-headed rails, beams, channels, angles, merchant bars, shapes, horse-shoes, and Martin steel; also, chains of all sizes; annual capacity, 25,000 net tons. Edward Cooper, President; Edwin F. Bedell, Secretary, New York. Frederick J. Slade, Treasurer; Joseph Stokes, Superintendent, Trenton. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

Oxford Iron Co., Oxford, Warren county. Built in 1866; 27 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, merchant bar, spike rods, nails, railroad spikes, fish joints, nuts and bolts; annual capacity, 16,000 net tons. S. T. Scranton, President. *See Furnaces.*

Passaic Rolling Mills, Passaic Rolling Mill Co., Paterson, Passaic county. Built in 1867, and incorporated in 1869; 8 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, 1 hammer, and 1 squeezer; product, beams, channels, angles, tees, and other shapes for buildings and bridges, merchant bars, rivets, nuts, etc.; annual capacity, 15,000 net tons. Specialty, shapes. Brand, "Passaic." Watts Cooke, President, and W. O. Fayerweather, Secretary and Treasurer. The Company are also bridge-builders and contractors.

Powerville Iron Works, John Leonard, lessee, Boonton. Works at Powerville. New York office, 450 West st. Built in 1845; 3 charcoal bloomary fires, 1 heating furnace, 2 trains of rolls, and 1 hammer; water-power; product, hoops, rods, and small bars to 2 inches in width, blooms and slabs; annual capacity, 1,000 net tons merchant iron, and 900 tons blooms and slabs. *See Bloomaries.*

Trenton Iron Co., Trenton. Built in 1845; 2 run-out fires, 8 forge fires, 6 heating furnaces, 2 hammers, and 4 trains of rolls (one 8, one 10, one 12, and one 19-inch); wire works, with 400 blocks; product, bar iron, rods, and wire. Charles Hewitt, President; and James Hall, Treasurer. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

Number of mills in New Jersey: 14. Of these, 1 rolls rails.

PENNSYLVANIA.

EASTERN DISTRICT.

Allentown Rolling Mill Co., Allentown, Lehigh county. Office, 303 Walnut st., Philadelphia. 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, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars. A. Pardee, Jr., President; C. W. Leavitt, Secretary; H. W. Allison, Treasurer; C. H. Nimson, Superintendent. *See Lehigh Valley Furnaces.*

Bethlehem Iron Co., Bethlehem, Northampton county. Established in 1863. Engine house; 230 ft. long x 60 ft. wide; two low-pressure engines, 54 in. diameter x 80 in. stroke; one compound blowing engine, 30 in. and 54 in. diameter x 80 in. stroke; upright compound pumping engine, 16 in. and 30 in. diameter x 34 in. stroke; two hori-

zontal compound pumping engines 16 in. and 30 in. diameter x 50 in. stroke; four double acting pumps, 16 in. x 5 ft., general supply; two double acting 300-lb. pressure pumps, 7½ in. diameter x 17 in. stroke, and pumps, machinery, and appurtenances for supplying water to the town of South Bethlehem. Mill No. 1; built in 1863; 13 double puddling furnaces and 1 single puddling furnace, 9 heating furnaces, one 21-inch train of rolls with 4 sets of housings, for iron rails, shapes, and merchant iron, one 12-inch train with 3 sets of housings, for small shapes and merchant iron, one 21-inch train for puddled iron, and 1 "universal" hoop mill; 1 hammer; squeezers, saws, shears, presses, etc.; product, railroad iron, cotton ties, hoops, etc.; annual capacity, 22,500 net tons. Mill No. 2; two 7-ton Bessemer steel converters, which made their first blow on October 4, 1873; first steel rail was rolled October 18, 1873; 4 cupolas; 2 Siemens melting furnaces; 3 steam hammers; 8 Siemens heating furnaces; two 32-inch blooming trains of rolls; two 24-inch trains with 4 sets of housings each, for steel rails, heavy shapes and merchant steel; one 15-inch train with 3 sets of housings, for merchant steel and small shapes; shears, saws, drills, punches, etc.; product, steel rails, billets, slabs and blooms; annual capacity, 72,000 net tons. Machine shop, blacksmith shop, and foundry connected with the works. G. B. Linderman, General Manager; Alfred Hunt, President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; John Fritz, Superintendent. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. & G. Brooke, Birdsboro, Berks county. Built in 1848; 7 double puddling furnaces, 2 scrap and 3 heating furnaces, 72 nail machines, and 2 trains of rolls; steam and water power; product, nails. Expect shortly to add a train of muck rolls and 3 or 4 puddling furnaces. *See Schuylkill Valley Furnaces.*

Brandywine Rolling Mills, S. & B. R. Hatfield, Coatesville, Chester county. Built in 1845; two mills, run by water-power, one-fourth of a mile apart; 2 heating furnaces and 2 trains of rolls; product, plate iron; annual capacity, 2,000 net tons. Puddling department in Huntingdon county, Pa. Idle for several years. *See Bloomeries.*

Bristol Rolling Mill, Nevegold, Scheide & Co., Bristol, Bucks county. Built in 1875; 1 heating furnace, and 2 trains of rolls (one 8 and one 12-inch) and 1 continuous hoop train; product, hoop, scroll and band iron; annual capacity, 2,000 net tons. Brand, "Bristol Mills."

Catasauqua Manufacturing Co., Catasauqua, Lehigh county. Company organized in 1864. Two mills: Catasauqua and Ferndale; 27 single puddling furnaces, 9 heating furnaces, 7 trains of rolls (10, 15, 18, and 22-inch), and one 10-ton hammer; product, highest grades of bar, tank,

and boiler iron, car axles, skelp iron, steel boiler and shovel plate, steel tire and merchant bar; annual capacity, 20,000 net tons. David Thomas, President; John Williams, Secretary; Oliver Williams, General Manager and Treasurer.

Chester Rolling Mills, Chester, Delaware county. Built in 1874-5; 8 double puddling furnaces, 2 Siemens heating furnaces, and 2 trains of rolls (one, 30 in. diameter x 72 in. long, and one, 30 in. diameter x 108 in. long); product, plate iron of all kinds; annual capacity, 12,000 net tons. President, John Roach; Secretary, D. F. Houston; Treasurer and Manager, C. B. Houston.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood & Brothers, Conshohocken, Montgomery county. Office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; 6 double puddling furnaces, 7 heating furnaces, and 7 20-inch trains of rolls; steam and water power; product, plate and sheet iron, embracing flue, boiler, tank, gasometer, nail, tack, shovel, and safe iron; annual capacity, 6,000 net tons.

Delaware Rolling Mills, Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Built in 1870; 8 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, all kinds of merchant bar iron; special shapes and sizes to order; annual capacity, 8,000 net tons. Brand, "H. & P. Best."

Easton Sheet Iron Works, Oliver & Co., Easton, Northampton county. Built in 1871 by Samuel Oliver, deceased, and put in operation February 1, 1872; 2 single "draught" puddling furnaces, 1 blast heating furnace, 1 anthracite-coal sheet furnace, 1 bituminous-coal annealing furnace, and 1 train of 22-inch rolls, consisting of 1 pair sheet rolls, and 1 pair bar rolls; product, bloom and refined sheet iron; annual capacity, 1,000 net tons. Production sold by Marshall Lefferts, Jr., 90 Beekman st., New York.

Fair Hill Forge and Rolling Mill, Gaulbert, Morgan & Caskey, York and America sts., Philadelphia. Built in 1854; 1 single and 2 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; product, merchant bar; annual capacity, 4,000 net tons.

Fort Allen Iron Works, Marshall Bros. & Co., 24 Girard avenue, Philadelphia. Works at Weissport, Carbon county. Rebuilt in 1872; 1 single and 2 double puddling furnaces, 2 heating furnaces, 1 squeezer, and 2 trains of rolls (one 9 and one 16-inch); product, guide and bar iron; annual capacity, 3,000 net tons. Not in operation since 1874. *See Penn Treaty Iron Works. See Upper Susquehanna Furnaces.*

Fulton Rolling Mill, Philadelphia and Reading Coal and Iron Co., Norristown, Montgomery county. Built in 1861; 11 double puddling fur-

- naces, 1 rotary squeezer, and 1 train 18-inch puddle rolls; product, puddled bar; annual capacity, 15,000 net tons. This mill is now standing, and is for sale or to rent. Agent, W. E. C. Coxe, Reading, Pa.
- Gibraltar Iron Works, S. Seyfert & Co., Reading. Built in 1846; 2 heating furnaces, 2 hammers, and one 16-inch train of rolls; water-power; product, boiler plate, boiler tube iron, and charcoal blooms; annual capacity, 1,500 net tons plate iron, and 1,000 tons blooms.
- Glasgow Iron Works, Glasgow Iron Co., Pottstown, Montgomery county. Puddle mill built in 1874; 4 double puddling furnaces, and 1 train of muck rolls; water-power; annual capacity, 5,000 net tons. Plate mill added in March, 1876, operated by steam, containing 3 heating furnaces and 1 train of rolls, 96 inches long; annual capacity, 6,000 net tons of boiler plate. Joseph L. Bailey, President; Comly B. Shoemaker, Treasurer; G. W. Nicolls, Secretary; Edward Bailey, General Manager.
- Glen Iron Works, owned by Solomon Boyer, James W. Wilson and others, Allentown. First put in operation in 1870; 6 double and 2 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8½ and two 15-inch); product, bar iron and small T rails; annual capacity, 7,500 net tons. Partly dismantled.
- Gray's Ferry Plate Iron Works, Edward S. Buckley, 228½ Walnut st., Philadelphia. Built in 1858; 3 double puddling furnaces, 4 charcoal forge fires, 4 heating furnaces, 2 trains of rolls, and 2 hammers; product, plate iron and charcoal blooms; annual capacity, 3,600 net tons plates, and 600 tons blooms.
- Hamburg Iron Works, Philadelphia and Reading R. R. Co., Hamburg, Berks county. Built in 1865; 3 double and 3 single puddling furnaces, 1 cupola furnace, 4 heating furnaces, one 3-ton steam hammer, and 2 trains of rolls (10 and 18-inch); product, bar iron of high class for machinery and tools; annual capacity, 4,000 net tons. This mill is now standing, and is for sale or rent. Agent, W. E. C. Coxe, Reading, Pa.
- Hibernia Forge and Rolling Mill, owned by Mrs. Wickersham and Miss Helen T. Brooke, Wagontown, Chester county. Forge built in 1792, and mill built in 1837; 4 charcoal forge fires, 1 heating furnace, 1 hammer, and 1 train of rolls; use wrought scrap; water-power; product, boiler tube and light boiler plate; annual capacity, 1,000 net tons. For sale.
- Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Built in 1845; 11 double puddling furnaces, 8 heating furnaces, a complete plant of nail machinery, and 7 trains of rolls; product, nails, horse-shoes, merchant bar, band, hoop and skelp iron, and steel plow, cultivator, and shovel plate; annual capacity, 11,000 net tons. Brand, "Anvil."

- Keystone Iron Works, Craig & Snell, Reading, Berks county. Built in 1857; 5 single puddling furnaces, 2 heating furnaces, and one 16-inch train of rolls; product, boiler plate, tank, chute, stack, pipe, boat and car iron, and muck bars; annual capacity, 2,000 net tons.
- Laurel Iron Works, Steele and Worth Co., Coatesville, Chester county. Built in 1825; 1 annealing furnace, 4 heating furnaces, and 3 trains of rolls; water and steam power; product, boiler, flue, boat, bridge, tank and tube iron; annual capacity, 4,800 net tons. Hugh E. Steele, President; J. S. Worth, Vice-President and General Superintendent; Jos. M. Downing, Secretary and Treasurer. *See Viaduct Iron Works.*
- Lehigh and Franklin Wire Mills, Stewart & Co., Easton, Northampton county. Built in 1837; 4 heating furnaces and 3 trains of rolls; product, wire rods, drawn into wire at the same establishment; annual capacity, 6,000 net tons.
- Little Schuylkill Rolling Mill, James A. Inness, Port Clinton, Schuylkill county. Built in 1868; 1 double and 2 single puddling furnaces, 1 heating furnace, and 3 trains of rolls (one 10, one 16, and one 18-inch); water-power; product, merchant bar and small T rails; annual capacity, 2,000 net tons merchant bar. These works also make cable and coil chain, using about 25 tons of iron per month. Chain works building, to be 42 ft. x 44 ft., and to contain 8 fires.
- Lukens Rolling Mills, Huston & Penrose & Co., Coatesville. Built in 1810; 3 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 1 hammer; steam and water power; product, all kinds of flue, boiler and ship plates, and bridge iron; annual capacity, 6,000 net tons. The puddle mill, operated by water-power, occupies the site of the first plate mill built in the United States.
- Maiden Creek Iron Works, Maiden Creek Iron Co., Blandon, Berks county. Office, 40 N. 6th st., Reading. Built in 1867; 1 double and 3 single puddling furnaces, 1 heating furnace, and 2 trains of rolls; product, round, square, flat, rivet, horse-shoe, hoop, band, scroll and skelp iron, and cotton ties; annual capacity, 4,000 net tons. James McCarty, General Manager, and Z. H. Maurer, Treasurer. Formerly called Blandon Iron Works.
- McIlvain (Wm.) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Built in 1857; 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and one 3-ton hammer; product, every variety of plate iron; annual capacity, 4,500 net tons. *See Bloomaries.*
- Mount Carbon Rolling Mill, Mount Carbon Rolling Mill Co., Mount Carbon, Schuylkill county. Four double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 16, one 18, and one 24-inch); product, merchant bar and plate iron.

- Norristown Iron Works, James Hooven & Sons, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, and 1 hammer; product, skelp iron; annual capacity, 5,000 net tons. James Hooven, owner. *See Schuylkill Valley Furnaces.*
- Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1842, and very much enlarged recently, especially in 1873; 3 heating furnaces, 3 trains of rolls, 1 hammer, 3 converting furnaces using wood exclusively, 2 converting furnaces using coal, and 24 2-pot crucible steel melting furnaces; convert Swedish iron into steel, reroll Norway iron, slit Norway nail rods, 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.
- Palo Alto Rolling Mill, Estate of Benjamin Haywood, Pottsville, Schuylkill county. Built in 1854; 12 double and 5 single puddling furnaces, 9 heating furnaces, and 5 trains of rolls (one 8, two 16, and two 18-inch); product, light and heavy T and street rails, fish bars, chairs, and merchant bar iron; annual capacity, 15,000 net tons. Idle for several years.
- Parkesburg Iron Works, Horace A. Beale & Co., Parkesburg, Chester county. First started in April, 1873; 2 double puddling furnaces, 3 charcoal finery fires, 3 heating furnaces, 1 train of rolls, and 1 hammer; product, tube skelp; annual capacity, 3,000 net tons. Horace A. Beale, owner.
- Pencoyd Iron Works, A. & P. Roberts & Co., 265 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; 9 double puddling furnaces, 10 heating furnaces, rotary squeezer, and 4 trains of rolls (one 12, two 18, and one 23-inch); product, channel bars, from 3 to 15 inches, beams, tee and angle iron, from 1 to 6 inches, hammered axles, rolled axles, and bar and bridge iron; the forge has 2 hammers; annual capacity, 15,000 net tons. Specialties, bridge and ship iron. Brand, "Pencoyd."
- Penn Treaty Iron Works, Marshall Brothers & Co., 1201 Beach st., Philadelphia. Built in 1856; 6 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls; product, sheet and bar iron; annual capacity, 4,000 net tons. *See Fort Allen Iron Works. See Upper Susquehanna Furnaces.*
- Philadelphia Iron and Steel Co., 939 North Delaware avenue, Philadelphia. Built in 1845; 1 single and 2 double puddling furnaces, 1 rotary squeezer, 7 heating furnaces, and 5 trains of rolls (two 8, one 12, and two 18-inch); product, bar, angle, and tee iron, fish plates, beams, street rails, and peculiar shapes; average annual capacity, single turn,

8,000 net tons. John P. Verree, President; W. A. Mitchell, Vice-President and Superintendent; B. F. Hart, Secretary and Treasurer.

Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Built in 1857; 9 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls (two 9, one 16, and one 17-inch); product, merchant bar iron, round, square, and flat, oval, half round, band and skelp iron; annual capacity, 12,000 net tons. Brand, "S. R. Best." *See Schuylkill Valley Furnaces.*

Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Co., W. E. C. Coxe, Superintendent, Reading. Built in 1868; 12 single puddling furnaces, 10 heating furnaces, and 3 trains of rolls (one 12, one 23, and one 24-inch); product, iron and steel rails and splice bars; annual capacity, 25,000 net tons. Specialty, reheated iron rails. Brand, "P. & R."

Phoenix Iron Works, Phoenix Iron Co., Phoenixville, Chester county. Office, 410 Walnut st., Philadelphia. Built in 1808; 20 double and 8 single puddling furnaces, 23 heating furnaces, and 5 trains of rolls (one 9, one 12, one 16, and two 18-inch); product, bar iron, beams, angles, tee iron, other shapes, and rails; annual capacity, 25,000 net tons. The Company are building a new mill of greater capacity than the old one. Samuel J. Reeves, President; John Griffen, Superintendent; Geo. Gerry White, Secretary; James O. Pease, Treasurer. *See Schuylkill Valley Furnaces.*

Pine Iron Works, Joseph L. Bailey & Co., Pine Iron Works, Berks county. Built in 1845; 2 heating furnaces and 1 train of rolls; water-power; product, boiler plate; annual capacity, 2,600 net tons. Sole manufacturers of the "Pine" brands of extra flange and fire-box iron.

Port Carbon Iron Works, Philadelphia and Reading Coal and Iron Co., Port Carbon, Schuylkill county. Eight double puddling furnaces, 1 large heating furnace, 2 small heating furnaces, 2 spike machines, and 2 trains of rolls (16-inch puddle train and 10-inch merchant train); capacity, puddled bars, 9,500 net tons; merchant bars, 2,500 net tons; spikes, 1,500 net tons. Foundry and machine shop attached. *See Schuylkill Valley Furnaces.*

Potts Grove Iron Works, Potts Brothers, Pottstown, Montgomery county. Built in 1846; 2 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls; product, plate iron, comprising boiler, tank, pipe, and flue iron; annual capacity, single turn, 3,000 net tons. Specialties, pipe and tube iron. This firm also has an 8-inch bar mill, 3,000 net tons yearly capacity, not operated for many years.

Pottstown Iron Co., Pottstown, Montgomery county. Built in 1863 and extended in 1867; 12 double puddling furnaces, 8 heating furnaces, 54 nail machines, 1 hammer, 1 squeezer, and 5 trains of rolls (one 21-inch muck, one 23-inch muck, one 23-inch nail plate, and two 25-inch plate); product, nails, and boiler, ship, and tank plate iron; annual capacity, nails, 7,000 net tons, plate, 7,500 tons. President, Theo. H. Morris; Vice-President, Andrew Wheeler; Secretary, Joseph K. Wheeler; Treasurer and General Manager, Wm. H. Morris. *See Schuylkill Valley Furnaces.*

Pottsville Rolling Mills, Atkins Brothers, Pottsville. Built in 1852, and rebuilt in 1863; 14 double and 4 single puddling furnaces, 8 heating furnaces, 1 hammer, and 3 trains of rolls; product, T rails of both light and heavy sections, street rails, and beams, channels and angles; annual capacity, 20,000 net tons. Built originally to make rails, and altered to roll shapes also in 1877. *See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh, Reading. Built in 1865; enlarged in 1872; 1 single puddling furnace, 2 heating furnaces, one 10-inch train of rolls, and 1 hammer; product, bar iron, which is used at these works for manufacturing machine bolts, lag screws, rods for buildings, bridges, etc., and hot pressed nuts of all sizes; annual capacity, about 3,000 net tons.

Reading Iron Works, Reading. Office, 261 South Fourth st., Philadelphia. Flue iron mill built in 1836; 12 single puddling furnaces, 4 heating furnaces, 1 rotary squeezer, 3 trains of rolls, 30 nail machines, and 2 railroad spike machines; product, cut nails, bar, band, hoop, and skelp iron; annual capacity, 6,600 net tons. Plate mill built in 1863; 7 double puddling furnaces, 4 heating furnaces, 1 hammer, and 4 trains of rolls; product, sheet, plate, and bar iron; annual capacity, 7,800 net tons. President, J. Penn Brock; Treasurer, F. W. Ralston; Secretary, J. S. Schroeder; B. H. West, General Superintendent. *See Schuylkill Valley Furnaces.*

Schuylkill Iron Works, Alan Wood & Co., Conshohocken. Office, 519 Arch st., Philadelphia. Built in 1858; 16 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, 1 hammer, and 2 rotary squeezers; product, sheet and plate iron; annual capacity, 15,000 net tons. *See Rolling Mills in Delaware.*

Schuylkill Haven Rolling Mill, William Weissinger, Schuylkill Haven, Schuylkill county. Put in operation November 1, 1873; 2 heating furnaces, 2 trains of rolls (one 8 and one 16-inch), and 1 railroad spike machine; product, merchant bar iron, small T rails, and railroad spikes; annual capacity, 3,000 net tons.

Tamaqua Rolling Mill, Chas. F. Shoener, Tamaqua, Schuylkill county.

Office, 328 Walnut st., Philadelphia. Built in 1865; 5 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 8½ and one 16-inch); product, hoop and band iron; annual capacity, 3,000 net tons. *See Coleraine Furnaces, Lehigh Valley.*

Thorndale Iron Works, Wm. L. Bailey, Treasurer, Thorndale P. O., Chester county. Built in 1847; 1 double and 2 single puddling furnaces, 2 heating furnaces, 2 trains of rolls (plate train 73 inches long), and 1 hammer; product, boiler and tank iron, and ship plates; annual capacity, 3,000 net tons.

Tioga Rolling Mill, Noblit & Brother, Germantown Junction, Philadelphia. Put in operation January 1, 1873; 2 heating furnaces, 2 trains of rolls (one 8 and one 10-inch), 1 hammer, and 3 spike machines; product, hoop, band, scroll, horse-shoe, and guide iron, and railroad spikes; annual capacity, 2,500 net tons.

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

Viaduct Iron Works, Steele and Worth Co., Coatesville. Built in 1838; 3 single puddling furnaces, 8 heating furnaces, 4 trains of rolls, and 1 hammer; product, all kinds of boiler, fire-box, boat, tank, tube and flue iron, and patent straightened bridge plates; annual capacity, 11,000 net tons. *See Laurel Iron Works.*

Winch's Rolling Mill, Spike, and Bolt Works, Corydon Winch, Canal st., Kensington, Philadelphia. New mill built in 1874; 4 heating furnaces, 4 trains of rolls, 12 spike machines, and 4 rivet machines; product, merchant bar, spike, and rivet iron; average annual product, 3,500 net tons.

Number of mills in Philadelphia: 11. Total number of mills in Eastern Pennsylvania: 53. Of these, 10 roll rails, 3 making only light T rails, and 1 only street rails.

CENTRAL DISTRICT.

Altoona Iron Co., Altoona, Blair county. First put in operation in April, 1873; 3 double and 6 single puddling furnaces, 3 heating furnaces, 3 trains of rolls (one 8, one 16 and one 18-inch), and 1 rotary squeezer; product, bar, band, and nut iron; annual capacity, 6,000 net tons. Light irons a specialty. Brand, "Altoona." S. C. Baker, President; Wm. M. Wheatley, Treasurer.

Bellefonte Iron Works, Valentines & Co., Bellefonte, Centre county. Built in 1800; 1 heating furnace and 1 train of rolls; steam and water power; product, bar, scythe, and shovel iron, boiler plate, etc.; annual capacity, 3,600 net tons. *See Charcoal Furnaces. See Bloomaries.*

- Berwick Rolling Mill, Berwick Rolling Mill Co., Berwick, Columbia county. Built in 1872; 5 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 3,600 net tons. C. G. Jackson, President, and C. R. Woodin, Vice-President.
- Central Iron Works, Harrisburg, Dauphin county. Built in 1853; 4 single puddling furnaces, 2 heating furnaces, 1 20-inch train of rolls, and 1 hammer; product, boiler plate and tank iron; annual capacity, 3,500 net tons. Charles L. Bailey, President; G. M. McCauley, Treasurer.
- Chesapeake Nail Works, Chas. L. Bailey & Co., Harrisburg, Dauphin county. Built in 1867; 14 single puddling furnaces, 3 heating furnaces, 2 trains of rolls (20-inch puddle, and 16-inch plate), and 66 nail machines; product, nails; annual capacity, 7,500 net tons.
- Chickies Rolling Mill, Becker & Reinhold, Chickies, Lancaster county. Built in 1865; 1 single and 3 double puddling furnaces, and 2 trains of rolls (9 and 16-inch); product, muck bar; annual capacity, 4,000 net tons. Idle for several years.
- Codorus Steel Works, York County Iron and Steel Co., York, York county. Built in 1869; 10 single puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, principally puddled steel for heading iron rails; annual capacity, 7,500 net tons. Not in operation since 1874.
- Columbia Steel and Iron Works, Wm. J. Howard, Columbia, Lancaster county. Built in 1854; 2 double puddling furnaces, 12 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls; product, rails; annual capacity, 15,000 net tons. Idle for several years.
- Co-operative Iron and Steel Works, Danville, Montour county. Built in 1871; 8 single puddling furnaces, 4 heating furnaces, and 2 trains of 18-inch rolls; product, all sizes of T rails from 16 to 65 lbs. per yard; street rails a specialty; annual capacity, 10,000 net tons. The machinery is fitted for 25,000 tons, needing only additional heating furnaces. M. J. Grove, President, and L. K. Rishel, Secretary, Treasurer and Manager.
- Crescent Iron and Nail Works, E. G. Heylman, Cogan Station, Lycoming county. Built in 1842; 2 single puddling furnaces, 1 heating furnace, 1 train of rolls, and 7 nail machines; water-power; product, bar iron and nails.
- Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1838; 11 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, and 52 nail machines; steam and water power; product, bar iron and nails. William Wister, President; John Wister, Treasurer; William E. S. Baker, Secretary and Assistant Treasurer. *See Upper Susquehanna Furnaces.*

Eagle Iron Works, Curtins & Co., Roland, Centre county. Built in 1810; 1 single puddling furnace, 1 heating furnace, 2 trains of rolls, and 1 squeezer; water-power; product, bar iron, boiler covers, and assorted iron from $\frac{1}{2}$ -inch round and square to $4\frac{1}{2}$ -inch tire; annual capacity, 2,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

Glendower Iron Works, A. Creveling, Danville, Montour county. Built in 1847; 14 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls; product, railroad iron, street rails, and merchant and muck-bar iron; annual capacity, 15,000 net tons. Formerly owned by the National Iron Co.

Harrisburg Nail Works, McCormick's Estate, Harrisburg. Works at West Fairview, Cumberland county. Built in 1810; 9 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 73 nail machines; steam and water power; product, nails and muck bars; annual capacity, 7,500 net tons of nails, and 2,000 tons of muck bars. Henry McCormick, Treasurer.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Co., Hollidaysburg, Blair county. Built in 1860; 8 single puddling furnaces, 3 heating furnaces, 3 trains of rolls, and 18 nail machines; product, merchant bar, pipe iron, 12 to 16-lb. T rails, "B. B." bolt rods, and cut nails and spikes; annual capacity, 3,500 net tons. J. W. Bracken, President, and B. M. Johnston, Secretary and Treasurer.

Howard Iron Works, Lauth, Thomas & Co., Howard, Centre county. Philadelphia office, 256 South Third st. Built in 1840; 6 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 16, one 12, and one 8-inch), and 1 rotary squeezer; water-power; product, all sizes merchant bar, band, hoop, and guide iron; annual capacity, 3,600 net tons. *See Bituminous Furnaces. See Charcoal Furnaces.*

Juniata Rolling Mill, Hollidaysburg and Gap Iron Co., Hollidaysburg. Built in 1866; 9 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, 30 nail machines, and 1 hammer; product, sheets and nails; annual capacity, 3,500 net tons. James Denniston, President; James M. Hewit, Secretary and Treasurer. Idle since March, 1876. *See Bituminous Furnaces.*

Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Co., Scranton, Lackawanna county. Commenced in 1840; 113 single puddling furnaces, 35 heating furnaces, and 12 trains of rolls (one 31, one 23 $\frac{1}{2}$, two 23, two 22, two 20, three 18, and one 8-inch), and 1 hammer; steam and water power; product, light and heavy railroad iron, merchant bar iron, and car axles; annual capacity, 112,000 net tons of rails, and 13,500 tons of merchant bar iron and car axles. Bessemer steel works added in 1875; two 5-gross-ton converters, 4 cupolas, and 4

spiegel furnaces; annual capacity, 85,000 net tons ingots; first blow made Oct. 23, 1875; first steel rail rolled Dec. 29, 1875. President, E. F. Hatfield, Jr., 52 Wall st., New York; General Manager, W. W. Scranton, at Scranton, Pa.; Secretary, Edward C. Lynde, Scranton, Pa. Brand, "Scranton." *See Upper Susquehanna Furnaces.*

Lancaster Rolling Mill, Manuel McShain & Co., Hempfield, Lancaster county. Office, 138 Walnut st., Philadelphia. Bought by present parties and enlarged in June, 1872; 1 double and 5 single puddling furnaces, 2 heating furnaces, 2 trains of rolls and 1 hammer; product, merchant bar and guide iron; annual capacity, 3,000 net tons. Idle since October, 1875.

Lebanon Rolling Mill, Ephraim Light, Lebanon. Built in 1867; 5 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, plate, sheet, and flue iron; annual capacity, 5,000 net tons.

Lochiel Rolling Mill Co., Harrisburg. Built in 1865; merchant mill completed in November, 1871; 8 double and 4 single puddling furnaces, 8 heating furnaces for rails, 4 heating furnaces for the merchant mill, and 4 trains of rolls (one 16 and three 18-inch); product, rails from 15 lbs. per yard upward, bar iron and splice bars; annual capacity, 25,000 net tons rails, and 3,000 tons merchant iron and splice bars. Henry McCormick, President, and A. J. Dull, General Manager. *See Lower Susquehanna Furnaces.*

Logan Works, Logan Iron and Steel Co., Lewistown, Mifflin county. Office, 218 South Fourth st., Philadelphia. Built in 1869 and 1877; 3 double puddling furnaces, 2 heating furnaces, 1 steam hammer, and 2 trains of rolls (one 12 and one 16-inch); steam and water power; product, rolled charcoal and refined iron, coupling links and pins. The Company have a plate mill not now in use, containing one 30-inch train of rolls, 3 heating furnaces, etc. Another part of the establishment, comprising a 10-ton hammer and a tire mill, is rented to the Standard Steel Works. President, John M. Kennedy; Secretary, C. Weston, Jr.; Treasurer, H. T. Townsend; Superintendent, R. H. Lee. *See Charcoal 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 bar iron, spring and soft wire rods, galvanized spring wire, and blooms for boiler plate; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

Milton Nail Works, C. A. Godcharles & Co., Milton, Northumberland county. Built in 1875; 5 single puddling furnaces, 1 heating furnace, 16 nail machines, and one 20-inch train of rolls; product, nails.

Milton Rolling Mill, Milton Iron Co., Milton, Northumberland county.

Put in operation December 1, 1872; 6 puddling furnaces, 1 heating furnace, and 3 trains of rolls; product, round, square, and flat bar iron; annual capacity, 2,000 net tons. Brand, "Milton." W. A. Schreyer, President, and P. C. Johnson, Treasurer.

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 7 single puddling furnaces, 1

heating furnace, 1 train of rolls, 1 rotary squeezer, and 22 nail machines, having Coyne's patent automatic nail assorters attached; product, nails, nail plate, axe bar, muck and scrap bars; annual capacity, 4,800 net tons muck bar, 4,000 tons nail plate and axe bars, 3,000 tons nails. Foundry and machine shop in connection.

Paxton Rolling Mills, McCormick's Estate, Harrisburg. Built in 1869; 5 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, and 1 hammer; product, boiler, skelp, and tank iron; annual capacity, 8,750 net tons. John Q. Denny, Manager.

Pennsylvania Iron Works, Waterman & Beaver, Danville. Office, 407 Library st., Philadelphia. Built in 1845; 22 double and 16 single puddling furnaces, 15 heating furnaces, 4 trains of rolls, and 1 hammer; product, railroad iron; annual capacity, 40,000 net tons. *See Upper Susquehanna Furnaces.*

Pennsylvania Rolling Mill, American Life Insurance Co., S. E. cor. 4th and Walnut sts., Philadelphia. Works at Lancaster. Put in operation in April, 1873; 8 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 18-inch puddle, one 16-inch bar, and one 8-inch guide); product, bar iron; annual capacity, 7,000 net tons. Idle.

Pennsylvania Steel Works, Pennsylvania Steel Co., Steel Works P. O., Baldwin Station, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel works built in 1865-7; made their first blow in June, 1867; two 6½-gross-ton converters; capacity, 350 net tons steel every 24 hours. Rolling mill built in 1867-8, and since enlarged; daily capacity, single turn, 150 tons steel rails; an extensive blooming mill was added to the rolling mill in 1875-6, and put in operation in December, 1876; daily capacity, single turn, 150 tons of rail blooms to supply the rolling mill. Hammer mill contains 6 and 12-ton hammers, the larger turning out 75 to 80 tons of blooms and forgings every 24 hours. Two Siemens open-hearth steel furnaces. Product, steel ingots, forgings, rails of heavy sections, street rails, and railroad axles, crossings, frogs, and switches. Capacity, 100,000 net tons ingots per annum. S. M. Felton, President; E. F. Barker, Secretary; H. C. Spackman, Treasurer; C. S. Hinchman, Sales Agent; Luther S. Bent, Superintendent. *See Lower Susquehanna Furnaces.*

- Portage Iron Works, John Musselman, Duncansville, Blair county. Built in 1839; 8 single puddling furnaces, 2 heating furnaces, 4 trains of 18-inch rolls, and 37 nail machines; product, nails; annual capacity, 4,600 net tons. Idle since 1875.
- Providence Rolling Mill, Spencer & Price, Providence, Lackawanna county. Built in 1876; 1 heating furnace, 1 hammer, and 1 train of rolls; product, merchant bar iron, made from scrap.
- Safe Harbor Rolling Mill, Phoenix Iron Co., Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. Built in 1848; 16 double and 2 single puddling furnaces, 8 heating furnaces, and 2 trains of rolls; product, railroad iron; has made 12,000 net tons of rails a year; has not made any rails since 1861, and the mill has not been in operation since 1865. *See Lower Susquehanna Furnaces.*
- Susquehanna Iron Works, Susquehanna Iron Co., Columbia. Three heating and 12 single puddling furnaces; product, bar iron. Wm. Patton, Treasurer; T. Masterson, Secretary.
- Towanda Iron Manufacturing Co., Towanda, Bradford county. First started in November, 1872; 3 double puddling furnaces, 3 heating furnaces, 24 nail machines, and 2 trains of rolls (15-inch puddle and 15-inch plate); product, nails; annual capacity, 1,500 net tons.
- Valentine Iron Co., John N. Lauth, lessee, Williamsport, Lycoming county. Built in 1873-4; 2 heating furnaces, 1 6-tuyere run-out fire, 8 forge fires, 1 hammer, and 3 trains of rolls (one 8 and two 15-inch); product, charcoal blooms, bars, and wire rods; iron for carriage bolts, shovels, and scythes a specialty; annual capacity, 4,000 net tons.
- Van de Sand & Capp, Lebanon. Three single puddling furnaces, 1 heating furnace, and 2 trains of rolls; product, bar iron; annual capacity, 2,000 net tons.

REMOVED.

- Danville Iron Works, Wm. Faux, Danville, Montour county. Built in 1870; 4 heating furnaces and 1 train of 16-inch rolls; product, rails; annual capacity, 11,000 net tons. Removed to Pueblo, Colorado, in 1877.
- Number of mills in Central Pennsylvania: 37. Of these, 9 roll rails, 1 making only light T rails.

WESTERN DISTRICT.

- Allegheny and Monongahela Iron Works, Lewis, Oliver & Phillips, Pittsburgh, Allegheny county. Built in 1866 and 1864, respectively; 60 single puddling furnaces, 14 heating furnaces, 2 rotary squeezers, and 9 trains of rolls (two puddle, two 16-inch bar, two 10-inch bar, and three 8-inch bar trains); product, bar iron, round, square and oval, bands, and peculiar and odd shapes, bolts, nuts, washers, hinges, and

other wrought iron hardware; annual capacity, 40,000 net tons. *See Birmingham Iron Works.*

American Iron Works, Jones & Laughlins, Pittsburgh. Built in 1852; 75 single puddling furnaces, 30 heating furnaces, 18 trains of rolls, and 73 nail machines; product, bars, nails, hoops, railroad spikes, plates, sheets, cold-rolled shafting, and 8 to 40-lb. T rails; annual capacity, 50,000 net tons.

Anchor Nail and Tack Works, Chess, Smyth & Co., Pittsburgh. Built in 1837; 20 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, 96 nail machines, 50 tack machines, and 1 hammer; product, nails, tacks and brads; annual capacity, 10,000 net tons.

Apollo Iron Works, Laufman & Co., Apollo, Armstrong county. Built in 1850; 9 single puddling furnaces, 6 heating furnaces, 2 annealing furnaces, and 6 pairs of rolls; product, fine sheet iron; specialties, pan, elbow, lock, shovel, show card, etc.; brand, "Apollo."

Atlantic Iron and Nail Works, Kimberly, Carnes & Co., Sharon, Mercer county. 28 puddling furnaces, 6 heating furnaces, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 8,000 net tons. *See Shenango Valley Furnaces.*

Birmingham Iron Works, Lewis, Oliver & Phillips, lessees, Pittsburgh. Built in 1836; 20 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls. These works do not make finished iron, but are operated in connection with the other works of the firm. *See Allegheny Iron Works.*

Brady's Bend Iron Co., Brady's Bend, Armstrong county. Built in 1842; 28 single puddling furnaces, 12 heating furnaces, and 3 trains of rolls; product, railroad iron; annual capacity, 20,000 net tons. Trustees, O. D. Ashley, 52 Williams st., New York, and C. N. Jordan, cashier 3d National Bank, New York. F. W. Rhoades, Agent, in charge of property. Not in operation since October, 1873. *See Bituminous Furnaces.*

Byers (A. M.) & Co., Pittsburgh. Built in 1862-3; 26 puddling furnaces, 6 heating furnaces, 1 scrap furnace, and 3 trains of rolls (one 16, one 18, and one 20-inch); also a galvanizing department and a pipe mill, to make butt-welded gas, steam and water pipe; product, bars, plates, sheets, shafting, and skelp iron; annual capacity, 15,000 net tons.

Cambria Iron and Steel Works, Cambria Iron Co., Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Built in 1853; 42 double puddling furnaces, 28 heating furnaces, and the following trains of rolls: 21-inch rail mill, 5 sets; 18-inch rail mill, 2 sets; 12-inch rail mill, 3 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 6 sets; 21-inch puddle mill, 6 sets, and 30-inch blooming mill, 1 set. Total 26 sets. Bessemer steel works made their first blow July 10

- 1871; two 5-gross-ton converters, (to be enlarged to 7-ton converters before Dec. 1, 1878,) and all the appliances for making rails. Two 10-ton Siemens-Martin open-hearth steel furnaces with the Pernot modification building in 1878. Product, iron and steel rails; total capacity per annum, 100,000 gross tons. E. Y. Townsend, President; Dr. Charles Stewart Wurts, Vice-President; John T. Killé, Secretary and Treasurer; D. J. Morrell, General Manager. See *Bituminous Furnaces*.
- Clinton and Millvale Rolling Mills, Graff, Bennett & Co., Pittsburgh. Built in 1846; 41 single puddling furnaces, 6 Danks rotary puddling furnaces, 17 heating furnaces, 11 trains of rolls, 41 nail machines, and 1 hammer; product, bars, sheets, plates and nails; annual capacity, 20,000 net tons. See *Allegheny County Furnaces*.
- Eagle Rolling Mill, Henry Savers, Pittsburgh. Built in 1825; 31 single puddling furnaces, 14 heating furnaces, 42 nail machines, and 7 trains of rolls (two 20-inch muck, one 16-inch bar, one 20-inch nail-plate, one 8 and one 10-inch guide, and one 3-high bar); product, bar iron. Nail mill has not been used recently. Formerly owned by James Wood's Sons & Co.
- Edgar Thomson Steel Works, Edgar Thomson Steel Company Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Began operations in August, 1875; two 7-gross-ton converters; 3 cupolas, 40 x 5; 4 spiegel cupolas, 40 x 2; two 12-ton cupola ladles; 20 tubular boilers, 15 x 5; hydraulic lifting machinery; 20 gas producers, and 7 Siemens heating furnaces; 32-inch, 3-high blooming mill, and 23-inch, 3-high rail train; machine and smith shops attached; product, Bessemer steel rails, blooms and billets; daily capacity, double turn, 300 gross tons ingots, and 250 gross tons rails and billets. First blow made on August 26, 1875, and first rail rolled on September 1, 1875. Brand, "Edgar Thomson steel." Use the best quality of Bessemer pig iron, mainly made from Lake Superior ore, containing not over 0.10 per cent. of phosphorus. Produce only Bessemer steel, in the several forms of rails, blooms, and billets, of all sizes down to 2 in. x 2 in. D. McCandless, Chairman; Wm. P. Shinn, Sec., and General Manager; Wm. R. Jones, General Superintendent.
- Erie Rolling Mill, Wm. L. Scott, Erie, Erie county. Built in 1872; 13 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 8, one 10, one 16 and one 20-inch); product, bar iron; annual capacity, 7,000 net tons.
- Etna Iron Works Limited, New Castle, Lawrence county. Consolidated November 1, 1874, from Etna Iron Co. and Onondaga Iron and Nail Co.; 2 double and 17 single puddling furnaces, 5 heating furnaces, 53

nail machines, and 4 trains of rolls (two 18, one 16, and one 8-inch); product, nails and merchant iron. Samuel Kimberly, President; A. W. Thompson, Secretary. *See Shenango Valley Furnaces.*

Etna Rolling Mill, Spang, Chalfant & Co., Pittsburgh. Built in 1828; new mill added in 1873-4; old mill has 24 single puddling furnaces, 9 heating furnaces, and 4 trains of rolls (one 8, one 12, one 16, and one 18-inch); new mill has 5 Siemens puddling furnaces, 1 Siemens heating furnace, and 2 trains of rolls; product, sheets, plates, rods, and tubing.

Fort Pitt Iron and Steel Works, John Graff, Pittsburgh. Built in 1862; 20 puddling furnaces, 15 heating furnaces, 7 hammers, 2 fusing discs, two 24-pot Siemens steel-melting furnaces, 4 shingle-strip machines, 2 horse-shoe machines, and 8 trains of rolls (22-inch muck train, 22-inch sheet-steel train, 16-inch sheet-steel train, 12-inch steel train, 9-inch steel train, 16-inch bar, 8-inch guide, and 8-inch hoop); product, plates, sheets, guide iron, bar iron, light T rails, and German and cast steel; annual capacity, 12,000 net tons merchant iron, 2,000 tons tool steel, and 6,000 tons of special steel, Siemens-Martin steel, German steel, and iron-centre cast steel for agricultural purposes. Formerly owned by Reese, Graff & Woods.

Glendon Rolling Mill, Dilworth, Porter & Co., Pittsburgh. Built in 1857; 24 single puddling furnaces, 8 heating furnaces, 9 railroad spike machines, and 5 trains of rolls (two 8, one 10, and two 16-inch), one train being a continuous train for spike iron; product, principally railroad and marine spikes; also railroad chairs, fish bars and bolts; annual capacity, 20,000 net tons. Brand, "Dilworth, Porter & Co."

Greenville Rolling Mill, Kimberly, Carnes & Co., Sharon. Works at Greenville, Mercer county. Built in 1871; 2 double and 5 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8 and two 16-inch); product, bar and hoop iron, principally hoop; annual capacity, 5,000 net tons. *See Shenango Valley Furnaces. See Atlantic Iron and Nail Works.*

Juniata Iron Works, Shoenberger & Co., Pittsburgh. Built in 1824 and 1857; 29 single puddling furnaces, 8 heating furnaces, 1 annealing furnace for sheet iron, 1 pair heating furnace for sheet iron, 6 furnaces for heating nail plates, 1 furnace for annealing nails, 8 hammers, and 6 trains of rolls (2 muck trains, one 16-inch bar, one 8-inch bar, one sheet train, and one nail-plate train), and 92 nail machines; product, nails, sheet and plate iron, horse and mule shoes, and horse-shoe bar; annual capacity, 18,000 net tons. Brand of nails and horse and mule shoes, "Juniata;" horse shoe bar, "Shoenberger;" sheet and plate iron, 3 grades, "Penn," "Charcoal," and "Juniata."

- Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Built in 1828; 16 single puddling and scrapping furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar, sheet and plate iron, flat rails, and T rails from 12 to 30 lbs. to the yard; annual capacity, 6,000 net tons.
- Keystone Rolling Mill, National Tube Works Co., lessee, McKeesport, Allegheny county. Rolling mill at Pittsburgh. Built in 1865; 19 single puddling furnaces, 1 scrap and 5 heating furnaces, and 4 trains of rolls; product, tube or skelp iron; annual capacity, 11,000 net tons. This mill formerly belonged to Glass, Neely & Co. The National Tube Works Co. contemplate the erection of a rolling mill near their tube works at McKeesport.
- Leechburgh Sheet Iron and Tin Plate Works, Kirkpatrick, Beale & Co., Leechburgh, Armstrong county. Office, 116 Water st., Pittsburgh. Built in 1872; 9 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; 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, and tin and terne plates; annual capacity, 2,900 net tons. Use natural gas for fuel.
- McKeesport Iron Works, W. D. Wood & Co., Pittsburgh. Works at McKeesport, Allegheny county. Built in 1851; 10 forge fires, 8 single puddling furnaces, 16 heating furnaces, 4 trains of rolls, and 4 hammers; product, sheet iron, both common and planished; annual capacity, 4,000 net tons.
- Middlesex Rolling Mill, Wheeler Iron Co., Sharon. Works at West Middlesex, Mercer county. Put in operation June 1, 1873; 10 single puddling furnaces, 1 heating furnace, and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron; annual capacity, 5,000 net tons. *See Shenango Valley Furnaces.*
- New Castle Iron Works, Bradley, Reis & Co., New Castle, Lawrence county. Built in 1873; 10 single puddling furnaces, 5 heating furnaces, 3 trains of rolls, and 1 hammer; product, light and heavy sheet iron from hammered blooms; annual capacity, 6,000 net tons.
- Old Fort Iron Works, Jones, Lewis & Co., Brownsville, Fayette county. Completed December 1, 1873; 6 single puddling and 3 heating furnaces, 2 trains of rolls, 2 spike and bolt machines, 2 hammers, and 1 squeezer; product, bar iron, light T rails, car axles, spikes and bolts, and general forgings; annual capacity, 9,000 net tons. William H. Morgan, Superintendent.
- Ormsby Iron Works, Boatman's Insurance Co., Pittsburgh. Built in 1863; 20 puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, bar, rod, guide and hoop iron; annual capacity, 14,000 net tons.

- Pennsylvania Iron Works, Everson, Macrum & Co., Pittsburgh. Built in 1844; 14 puddling furnaces, 8 heating furnaces, and 5 trains of rolls (two sheet, one bar, one guide, and one muck train); product, bar, sheet and guide iron; annual capacity, 6,000 net tons. *See Scottdale Rolling Mill. See Bituminous Furnaces.*
- Pittsburgh Bolt Works, owned by First National Bank, Second National Bank, and Iron City National Bank, Pittsburgh. 24 single puddling furnaces, 7 heating furnaces, and 6 trains of rolls (one 8, one 10, and four 18-inch); product, nuts, bolts and railroad supplies; annual capacity, 15,000 net tons. Idle.
- Pittsburgh Forge and Iron Co., 10th st., near Penn avenue, Pittsburgh. Built in 1864; 15 single puddling furnaces, 7 heating furnaces, 3 trains of rolls, and 3 hammers; product, (1) bar, rod, band, hoop, oval and half oval iron, fish plates, and track bolts, and (2) hammered car and locomotive axles, railroad, steamboat and machine forgings; annual capacity, (1) 13,000 net tons, (2) 2,000 tons. Brands, "P. F. & I." and "V. C." Calvin Wells, President and Treasurer, and James K. Verner, Secretary.
- Pittsburgh Iron Works, Jacob Painter & Sons, Pittsburgh. Built in 1833; 52 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, 24,000 net tons. Brand, "Painter."
- Sable Iron and Nail Works, Zug & Co., Pittsburgh. Built in 1845; 34 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 59 nail machines; product, merchant bar iron, including heavy sizes flat bars and squares made by the "universal" rolls, and nails; annual capacity, 18,000 net tons. Brand, "Sable."
- Scottdale Rolling Mill, Everson, Macrum & Co., Pittsburgh. Works at Scottdale, Westmoreland county. Built in 1873; 11 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, muck bar and sheet iron; annual capacity, 5,000 net tons. *See Pennsylvania Iron Works. See Bituminous Furnaces.*
- Sharon Iron and Nail Works, Westerman Iron Co., Sharon, Mercer county. Built in 1862; 15 double puddling furnaces, 12 heating furnaces, 6 trains of rolls (two 8, one 16, two 18, and one 20-inch), and 46 nail machines; product, bar, hoop, and sheet iron, railroad and boat spikes, light T rails and nails; annual capacity, 17,000 net tons. Brand, "Westerman." F. H. Buhl, Manager. *See Shenango Valley Furnaces.*
- Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence county. Built in 1848; 27 single puddling furnaces, 9 heating fur-

naces, 5 trains of rolls, and 55 nail machines; product, bars, light T rails, sheets, bands, wrought spikes, and nails; annual capacity, 15,000 net tons. *See Shenango Valley Furnaces.*

Sligo Iron Works, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 27 puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (one 12, one 16, one 18, one 24, and one 30-inch); product, bar, sheet, and plate iron, and light T rails; fire-box iron a specialty; make "Sligo" bars, and "Tyrone" refined iron; boiler heads and flue holes flanged to order; annual capacity, 16,000 net tons.

Soho Iron Mills, Moorhead & Co., Pittsburgh. Built in 1859; 12 knob-bling fires, 11 single puddling furnaces, 6 heating furnaces, 4 sheet furnaces, 3 pair furnaces, 5 annealing furnaces, one 6-tuyere refinery, 6 trains of rolls (1 muck and 5 sheet trains), and 1 hammer; product, galvanized, Juniata, charcoal, and common sheet and plate iron; annual capacity, 10,000 net tons.

Solar Iron Works, Wm. Clark & Co., Pittsburgh. Built in 1869; 19 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls (one 7, two 8, one 12, and one 18-inch); product, hoop, band, and scroll iron; annual capacity, 8,000 net tons.

Star Iron Works, Lindsay & McCutcheon, Allegheny City, Allegheny county. Built in 1862; 19 puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, hoop, band, and horse-shoe iron; annual capacity, 8,000 net tons. Brand, "Star."

Stewart Iron Works, Stewart Iron Co. Limited, Sharon, Mercer county. Built in 1870; 16 single puddling furnaces, 1 hammer, and 2 trains of 18-inch rolls; product, muck bar and blooms; annual capacity, 9,000 net tons. Chairman, David Stewart, 119 Broadway, New York City; Fayette Brown, Cleveland, O., General Agent; Theo. F. Hicks, Secretary, New York City; G. P. Lloyd, Treasurer, New York City; Samuel McClure, Agent, Sharon, Pa. *See Shenango Valley Furnaces.*

Superior Rolling Mill, Andrew Kloman, lessee, Pittsburgh. Built in 1865; 30 single puddling furnaces, 16 heating furnaces, and 4 trains of rolls; product, iron and steel structural material; special facilities for the manufacture of heavy steel rolled shapes and unusual shapes and sizes in both iron and steel, tees, angles, etc. This mill formerly made rails exclusively, but will now make no rails. *See Allegheny County Furnaces.*

Union Forge and Iron Mills, Wilson, Walker & Co., Pittsburgh. Built in 1862; 15 single puddling furnaces, 8 heating furnaces, 8 hammers, and 5 trains of rolls (one 18, one 15, and one 10-inch, and 2 "universal" plate trains); product, railroad specialties and bridge work, angles, and peculiar shapes, and bar iron; annual capacity, 9,000 net tons.

Union Iron Mills, Carnegie Brothers & Co., Pittsburgh. Built in 1862; 21 single puddling furnaces, 10 heating furnaces, 7 trains of rolls, and 1 hammer; product, beams, channels, tees, angles, plates, and bar iron; annual capacity, 27,000 net tons.

United States Iron and Tin Plate Works, U. S. Iron and Tin Plate Co., 112 Smithfield st., Pittsburgh. Works at Demmler Station, near McKeesport, Allegheny county. Built in 1873-4; 3 puddling and 2 heating furnaces, 4 knobbling fires, 2 double sheet-mill furnaces, 2 annealing furnaces, 3 tinning stacks in operation and 1 in course of erection, 1 hammer, and 1 train of bar rolls, 2 trains of sheet rolls, and 3 sets of cold rolls; product, tin and terne plates, and odd sizes of common and charcoal polished black plates and Bessemer steel plates; specialty, stamping iron and show-card iron. Terne plates branded "U. S.;" black plates, "U. S. A." J. H. Demmler, President; James Nimick, Vice-President; H. H. Demmler, Treasurer; W. C. Crone-meyer, Secretary; John B. Davies, Superintendent.

Valley Rolling Mill, Colwell, Mosgrove & Co., Kittanning, Armstrong county. Built in 1848; 16 single puddling furnaces, 5 heating furnaces, 3 trains of rolls, 22 nail machines, and 1 squeezer; product, rod and sheet iron, nails, and spikes; annual capacity, 7,000 net tons. Idle since March, 1873.

Vesuvius Iron and Nail Works, D. M. Barbour, Trustee of Lewis, Dalzell & Co., Pittsburgh. Built in 1846; 24 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 50 nail machines; product, bar, sheet and tank iron, rods, hoops, and nails; specialties, dripping and bread pans, sheet iron powder kegs, paint, putty and white-lead pails, buckets and measures. Brand, "Vesuvius."

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1829; 28 puddling furnaces, 7 heating furnaces, 5 trains of rolls, 2 steam hammers, 24 steel-melting holes, and two 45-ton converting furnaces; product: Iron—bars, rods, hoops, sheets, light T rails, splice bars, boiler plate and rivets. Steel—cast, German, and "U. S." refined. Annual capacity, 10,000 net tons of iron, and 3,500 net tons of steel. Brands: Ordinary refined bar, "Wayne;" special, "Bloom;" highest quality, "U. S." Boiler plate, "U. S." (tensile strength, 65,000.) Steel, "Wayne," "Brown's Best German," "U. S. Refined," "Imperial," and "Cast."

Wheatland Rolling Mills, B. B. Reath, 1538 Pine st., Philadelphia. Works at Wheatland, Mercer county. Built in 1872; 12 double puddling furnaces, 14 heating furnaces, and 3 trains of rolls; product, rails, bars and sheet iron; annual capacity, 45,000 net tons. Not in operation since 1874. *See Shenango Valley Furnaces.*

Number of iron rolling mills in Pittsburgh and Allegheny county: 31. Total number of mills in Western Pennsylvania: 48. Of these, 12 roll rails, 8 making only light rails. Total number of mills in Pennsylvania: 138. Of these, 31 roll rails, 12 making only light rails, and 1 only street rails.

DELAWARE.

Christiana Iron Co., Wilmington, New Castle county. Built in 1873-4; 2 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, boiler plate, flue, ship, and tank iron. Geo. G. Lobdell, President, and Jno. W. Huxley, Secretary and Treasurer. Has not been in operation since its erection.

Delaware Iron Works, Alan Wood, Wooddale, near Wilmington. Office, 519 Arch st., Philadelphia. Built in 1812; one 20-inch train of rolls; water-power; product, sheet iron; annual capacity, 550 net tons. *See Schuylkill Iron Works, (Rolling Mills,) Eastern Pennsylvania.*

Diamond State Iron Co., Wilmington. New York office, 71 Broadway. Two mills: Diamond State Mill; built in 1853; 3 double and 3 single puddling furnaces, 1 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, and bridge bolts; annual capacity, 16,000 net tons. Old Ferry Mill; built in 1868; 2 double puddling furnaces, 2 heating furnaces, one 16-inch puddle mill, and one 8½-inch bar mill; product, all kinds of bar iron; annual capacity, 4,000 net tons. H. Mendinhall, President; Clement B. Smyth, Vice-President and Treasurer; George W. Todd, Secretary.

Edge Moor Iron Works, Wilmington. Begun in 1873; not yet completed. Wm. Sellers, President, and George Sellers, Manager.

Marshallton Iron Works, John R. Bringhurst, Marshallton, New Castle county. Built in 1836; 1 heating furnace and 1 train of rolls; water-power; product, sheet iron; annual capacity, 700 net tons.

Minquas Iron Works, McCullough Iron Co., Wilmington. Built in 1873, and first put in operation in 1875; 6 single puddling furnaces, 1 reverberatory heating furnace, 3 grate heating furnaces, 1 annealing furnace, 4 trains of rolls and 1 hammer; product, sheet iron; annual capacity, 3,000 net tons. D. McDaniel, President; John H. Adams, Vice-President; William S. Hagany, Treasurer; Wickham B. Spear, Clerk. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. *See Maryland Rolling Mills. See Bloomaries.*

New Castle Rolling Mill, Delaware Iron Co., New Castle, New Castle county. Office, 230 South Third st., Philadelphia. Removed from Bristol, Pa., and rebuilt at New Castle, and enlarged in 1874-5; 3

double puddling furnaces, 2 heating furnaces, 1 train of rolls (comprising 1 set of bar rolls, and 3 sets of skelp rolls), and 1 hammer; product, bar and skelp iron; annual capacity, 4,500 net tons.

Newport Rolling Mills and Volta Galvanizing Works, J. Marshall Company, Newport, New Castle county. Rolling mills built in 1873; galvanizing works, in 1877; 3 single puddling furnaces, 1 heating furnace, 2 grate furnaces, 2 annealing furnaces, 1 rotary squeezer, and 3 trains of rolls; product, black and galvanized sheet iron; annual capacity, 1,500 net tons. Brands are "Crescent," "A. R. G.," "Rooster," and "D. S.," for black iron, and "Crescent" and "Rooster" for galvanized.

Wilmington Plate Iron Rolling Mills, Seidel, Hastings & Co., Wilmington. First mill built in 1845; second, in 1870; another mill, for tops and bottoms only, with a train of rolls 17 in. x 48 in., was built in 1875; 5 forge fires (equal to 6 puddling furnaces), 4 heating furnaces, 3 trains of rolls, and 3 hammers; product, boiler, ship, and tank iron; annual capacity, 5,000 net tons.

Number of mills in Delaware: 8 completed mills and 1 building.

MARYLAND.

Abbott Iron Works, Abbott Iron Co., P. O. Box 185, Baltimore. (1) Plate mills, built in 1851, have 6 double puddling and 8 heating furnaces, 1 hammer, and 5 trains of rolls; 2 sets Lauth's patent 3-high plate rolls, with facilities for rolling plate to 100 inches in width, and girder plates 40 feet in length. (2) Rail mill, built in 1865, has 17 double puddling and 10 heating furnaces, 3 trains of rolls, and 1 hammer. Product (1), boiler, tank, boat, still, car, and bridge plates; annual capacity, 10,000 net tons. Product (2), iron rails; annual capacity, 25,000 net tons. Charles H. Ashburner, President; J. S. Gilman, Vice-President and Treasurer.

Baltimore Steam Forge and Rolling Mill, Trego, Thompson & Co., Baltimore. Built in 1853; 4 double puddling and 3 heating furnaces, 1 train of rolls, and 2 hammers; product, bar iron and car axles; annual capacity, 3,000 net tons.

Canton Iron Works, Anderson Bros. & Co., Canton, Baltimore county. Built in 1878; 2 heating furnaces, one continuous wire rod rolling machine, and 2 trains of rolls (one 8 and one 15-inch); product, scythe, hoe, and shovel iron; carriage bolt iron and wire rods are specialties; use exclusively cold blast charcoal iron; annual capacity, 1,500 net tons, single turn.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Co., Cumberland, Alleghany county. Rail mill built in 1870; 15 double puddling furnaces, 16 heating furnaces, 3 trains of rolls, and 3 hammers; prod-

uct, rails and axles; annual capacity, 33,000 net tons. Bar mill built in 1873; 4 single puddling furnaces, 6 heating furnaces, and 3 trains of rolls; product, bar, bridge, and all sizes guide iron; annual capacity, 8,000 net tons.

Locust Point Rolling Mill, Coates & Brother, Baltimore. Built in 1862; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; product, plate and flue iron; annual capacity, 4,500 net tons. McCullough Iron Co., Northeast Iron Works, Northeast; West Amwell Iron Works, Elkton; and Octoraro Iron Works, Rowlandville; all in Cecil county. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. Northeast and West Amwell mills were built in 1847; 10 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 1 hammer; water and steam power; product, sheet iron for galvanizing, and boiled iron of the kind called "Harvey's patent cleaned;" annual capacity, 7,000 net tons. A bloomary of 8 fires is at the same place, also owned by this Company. Octoraro mill was built in 1829; 4 heating furnaces for making sheet iron, and 4 trains of rolls; water-power; product, sheet iron, from No. 12 to 28, inclusive; annual capacity, 2,500 net tons. The muck bar used at Octoraro mill comes from the other mills. *See Delaware Rolling Mills. See Bloomaries.*

Number of mills in Maryland: 6. Of these, 2 roll rails.

DISTRICT OF COLUMBIA.

Equipment Iron Rolling Mill, (under control of Bureau of Equipment and Recruiting, United States Navy Department,) Navy Yard, Washington. Built in 1878; 7 forge fires, 2 scrap furnaces, 2 hammers, and 5 trains of rolls; product, bar iron and plate iron. James Wilson, Superintendent.

Number of mills in District of Columbia: 1.

VIRGINIA.

Graham's Forge, Graham & Robinson, Graham's Forge, Wythe county. Built in 1828; 3 heating furnaces, 4 trains of rolls, 5 nail machines, and 1 hammer; water-power; product, nails, and horse-shoe, tire and plate iron, blooms, and hammered iron; annual capacity, 300 net tons of blooms, 600 tons rolled iron, and 300 tons nails; but no nails have been made for some time. This rolling mill is run at intervals through the year to supply the local trade. *See Furnaces. See Bloomaries.*

Lynchburg Iron Works, Gen. T. T. Munford, Lynchburg, Campbell county. Built in 1872; 1 heating furnace, 2 spike furnaces, 2 spike machines, 1 bolt machine, and one 10-inch train of rolls; steam and

water power; product, merchant iron, railroad and boat spikes, and bolts. Idle in 1878.

Lynchburg Rolling Mill, S. A. Caldwell, Lynchburg. Office, 327 Chestnut st., Philadelphia. Situated $4\frac{1}{2}$ miles above Lynchburg, on the James river and Kanawha canal. Built in 1867; 4 double puddling and 4 heating furnaces, 2 spike machines, 1 rivet machine, 1 bolt machine, and 4 trains of rolls (three 18-inch and one 10-inch); water-power; annual capacity, 10,000 net tons. Built to make rails, and afterwards changed to bars. Idle since 1873.

Old Dominion Iron and Nail Works, Richmond. Works at Belle Isle, Henrico county. Improved and enlarged since 1865; 5 double and 10 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, 76 nail machines, and 1 hammer; water-power; product, nails, bar and band iron; annual capacity, nails, 7,500 net tons, rolled iron, 3,600 tons. R. E. Blankenship, Commercial Agent.

Tredegar Iron Works, Tredegar Company, Richmond. Built in 1837; 1 double and 23 single puddling furnaces, 16 heating furnaces, and 6 trains of rolls; water-power; product, merchant bar iron, railroad axles, bridge iron, fish plates, spikes, chairs, track bolts, and horse-shoes; annual capacity, 34,000 net tons. Joseph R. Anderson, Receiver, and R. S. Archer, Manager. *See Furnaces.*

Number of mills in Virginia: 5.

GEORGIA.

Atlanta Rolling Mill, Atlanta Rolling Mill Co., Atlanta, Fulton county. Built in 1865-6; 5 double puddling furnaces, 7 heating furnaces, 5 trains of rolls, 6 shears, 1 bolt machine, 1 spike machine, and 2 squeezers; product, rails, merchant bar iron, fish bars, bolts and nuts, and spikes; annual capacity, rails, 15,000 net tons, and bar iron, fish bars, etc., 2,000 net tons. Wm. C. Morrill, President; Wm. Goodnow, General Manager; Thos. W. Chandler, Secretary and Treasurer; Robert Kyle, Superintendent.

Rome Iron Works, Empire Iron Co., Rome, Floyd county. One single and 2 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, 20 nail machines, 1 spike machine, 1 railroad spike machine, and 2 shears; product, bar iron, nails and spikes; annual capacity, nails, 2,000 net tons; spikes, 1,000 tons; bar iron, 3,500 tons. R. T. Hargrove, President.

Number of mills in Georgia: 2; one making rails.

ALABAMA.

Central Iron Works, Fell & Co., Helena, Shelby county. Put in opera-

tion in March, 1873; 4 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, bar and hoop iron; cotton ties a specialty; annual capacity, 1,000 net tons.

Number of mills in Alabama: 1.

WEST VIRGINIA.

Belmont Nail Works, Wheeling, Ohio county. Built in 1849; 25 single puddling furnaces, 4 heating furnaces, 3 trains of rolls, 111 nail machines, and 1 squeezer; product, nails exclusively; annual capacity, 12,000 net tons. Henry Moore, President, and J. D. DuBois, Vice-President and Treasurer. *See Furnaces.*

Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. Built in 1852; 21 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 112 nail machines; product, nails exclusively; annual capacity, 13,750 net tons. A. W. Campbell, President; L. S. Delaplain, Vice-President; Alonzo Loring, Secretary. *See Miscellaneous Bituminous Furnaces in Ohio.*

Clifton Nail Co., Middleport, Meigs county, Ohio. Works at Clifton, Mason county, West Virginia. Built in 1867; 14 single puddling furnaces, 3 heating furnaces, 1 train of rolls, and 45 nail machines; product, nails exclusively; annual capacity, 5,500 net tons. W. P. Rathburn, President; G. W. Plants, Vice-President; H. H. Swallow, Secretary and Treasurer; Geo. E. Downing, General Superintendent.

Crescent Iron Works, Whitaker Iron Co., Wheeling. Built in 1855; 15 double puddling furnaces, 16 heating furnaces, and 6 trains of rolls; product, light and heavy T rails, sheet and fire-bed iron, spikes, and splice bars; annual capacity, 38,000 net tons. Have run only on sheet and plate iron since 1875. Have four sheet trains. George P. Whitaker, President, Principio, Md.; N. E. Whitaker, Secretary, Wheeling.

La Belle Iron Works, Wheeling. Built in 1852; incorporated Dec. 3, 1875; 22 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 89 nail machines; product, nails and spikes, exclusively; annual capacity, 10,000 net tons. S. H. Woodward, President; J. H. Woodward, Secretary.

Ohio Valley Iron Works, Ohio Valley Iron Co., Moundsville, Marshall county. Put in operation March 1, 1874; 8 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 19-inch); product, merchant bar of all sizes; specialty, hoop iron for oil barrels; annual capacity, 4,500 net tons. J. W. Gallaher, President; J. T. Frissell, Secretary; Lott H. Joy, Manager.

Riverside Iron Works, Wheeling. Built in 1859, and since enlarged; 34 single puddling furnaces, 8 heating furnaces, 126 nail machines,

and 5 trains of rolls (one 9, one 12, two 20-inch and one 21-inch); product, bar iron, light T rails, railroad spikes, and nails; annual capacity, 4,500 net tons of bar iron and 300,000 kegs of nails. Brand, "Riverside." J. N. Vance, President; John D. Culbertson, Treasurer; N. Wilkinson, Secretary; Frank J. Hearne, Superintendent. *See Furnaces.*

Top Mill, Wheeling Iron and Nail Co., Wheeling. Built in 1867, and rebuilt in 1872; 26 single puddling furnaces, 4 heating furnaces, 106 nail machines, double muck train, and 1 nail-plate train of rolls; product, nails; annual capacity, 12,000 net tons. *See Furnaces.*

Number of mills in West Virginia: 8. Of these, 2 roll rails, 1 making only light rails.

KENTUCKY.

- Anchor Iron and Steel Works, L. M. Dayton, Cincinnati, Ohio. Works at Newport, Campbell county, Ky. Rebuilt and fitted with new machinery in 1874; 6 single puddling furnaces, 3 heating furnaces, 1 scrap furnace, 1 hammer, and 4 trains of rolls (one 10, one 18, and two 20-inch); product, bar, sheet, and plate iron; annual capacity, 4,000 net tons. John Phillips, Superintendent.
- Covington Rail Mill, James G. Kyle & Bro., 33 West Third st., Cincinnati, Ohio. Works at Covington, Kenton county, Ky. Built in 1854; 9 single puddling furnaces, 7 heating furnaces, 1 hammer, and three 19-inch trains of rolls; product, T rails from 30 to 63 lbs., and street rails from 33 to 45 lbs.; annual capacity, 15,000 net tons.
- Kentucky Rolling Mill, Louisville. Built in 1869; 13 puddling furnaces, 1 scrap, and 3 heating furnaces; one 18-inch forge mill, 2 pairs rolls and Burden squeezer; one 12-inch, 3-high bar mill; and one 8-inch, 3-high guide mill; product, bar, band, hoop, and horse-shoe iron; light T rails, from 10 to 40 lbs., for narrow gauge roads, mines, etc., and tram rails, from 20 to 45 lbs., for street railways, a specialty; annual capacity, 6,000 net tons, single turn. Idle.
- Licking Iron Works, Worthington, Droege & Hampton, 58 and 60 East Second st., Cincinnati, Ohio. Works at Covington, Ky. Built in 1845; 1 single and 5 double puddling furnaces, 7 heating furnaces, 1 hammer, and 6 trains of rolls (one 16-inch muck, one 16-inch bar, one 8-inch guide, one 6-inch guide, one 22-inch boiler plate, and one 20-inch sheet); product, merchant bar, bridge, boiler, and sheet iron, rivets, angle, and tee iron, jail, sash, and corrugated-roofing iron, railroad spikes, fish-plates, and hand-made chains; annual capacity, 7,000 net tons.
- Louisville Rolling Mill, Louisville Rolling Mill Co., Louisville. Organized in 1849; 20 single puddling furnaces, 1 scrap furnace, 5 heating furnaces, 1 hammer, and 5 trains of rolls (two 8, one 16, one 18, and

one 22-inch); product, bar, sheet, plate, light T rails, hoops, bands, small rounds, squares, and flats, steel, and horse-shoes; annual capacity, 9,000 net tons, single turn.

Norton Iron Works, Ashland, Boyd county. Put in operation in March, 1874; 20 single puddling furnaces, 3 heating furnaces, 80 nail machines, and 2 trains of rolls (one 20, and one 22-inch); product, nails; annual capacity, 10,000 net tons. John Russell, President; A. R. Fen-nacy, Secretary; Hugh Means, Treasurer. Charles L. Colburn, Agent, 23 West Third st., Cincinnati. *See Furnaces.*

Ohio Valley Steel and Iron Works, Mitchell, Tranter & Co., 52 West Second st., Cincinnati, Ohio. Works at Covington, Ky. Built in 1873; 10 puddling, 2 scrap, 2 slab, and 2 plate-mill furnaces, 2 anneal-ing and 4 heating furnaces, and 6 trains of rolls; product, plate, chan-nel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, 12,000 net tons. Brand, "O. V."

Paducah Iron Works, Paducah, McCracken county. Built in 1854; 4 double and 5 single puddling furnaces, 4 heating furnaces, and 5 trains of rolls; product, bar, hoop, sheet, and boiler iron; annual capacity, 5,000 net tons. Sometimes called Gates, Brown & Co.'s mill, and sometimes Harris, Brown & Co.'s. Now held for sale at a low price by Q. Q. Quigley, President Commercial Bank of Kentucky, Paducah.

Swift's Iron and Steel Works, Cincinnati, Ohio. Works at Newport, Campbell county, Ky. Built in 1857; 31 single puddling and 14 heat-ing furnaces, 4 knobbling fires, 10 steel-melting holes, and 8 trains of rolls (8, 10, and 18-inch bar trains, 2 forge, 1 sheet, and 2 plate trains); product, boiler and common plate, light and heavy sheet, merchant bar, shaped irons, light T and street rails, and steel safe and plow plate; annual capacity, 30,000 net tons. Alexander Swift, President; Geo. E. Clymer, Vice-President; E. L. Harper, Treasurer; L. T. Hub-bard, Secretary. *See Furnaces.*

Tennessee Rolling Works, D. Hillman & Sons, Tennessee Rolling Works, Lyons county. Branch office at Nashville, Tennessee. Built in 1846; 7 single puddling furnaces, 12 knobbling fires, 6 heating furnaces, 2 hammers, and 5 trains of rolls (8-inch guide, 10 and 18-inch bar, and 20 and 26-inch plate trains); product, boiler plate, sheet iron, bar and rod iron and blooms; annual capacity, 4,000 net tons. *See Furnaces.*

Number of mills in Kentucky: 10. Of these, 4 roll rails, 3 making only light T and street rails.

TENNESSEE.

Knoxville Iron Co., Knoxville, Knox county. Built in 1865; 4 single puddling furnaces, 1 heating furnace, 12 nail machines, and 2 trains of rolls (8 and 15-inch); product, merchant bar and nails; annual capa-

city, 2,400 net tons. W. R. Tuttle, President; W. S. Mead, Vice-President and Treasurer; W. H. Van Beschoten, Secretary.

Roane Iron Works, Roane Iron Co., Chattanooga, Hamilton county. Rolling mill built in 1864; puddle mill built in 1869; 9 double puddling furnaces, 10 heating furnaces, 1 hammer, and 3 trains of rolls (two 18 and one 20½-inch); product, rails; annual capacity, 28,000 net tons. Steel plant added in 1877-8; first cast made June 6, 1878; melting house, 80 ft. x 130 ft.; three 10-ton Siemens open-hearth furnaces; 12 gas producers; 36-inch Fritz blooming mill; use the "pig and ore" process; product, steel for merchant and rail purposes. W. P. Rathburn, President; H. S. Chamberlain, Vice-President and General Manager; H. Clay Evans, Secretary. C. Constable, Manager of Furnaces, Rockwood, Roane county. *See Furnaces.*

Tennessee Iron and Steel Co., Chattanooga. Started in October, 1876; 2 heating furnaces and 1 train of rolls; product, strictly merchant bar iron, 10 to 16-lb. T rails, rail splices, and steel. Buy steel blooms from the Providence Steel Works. L. Scofield, President and Manager; J. A. Austin, Treasurer and Agent; L. Scofield, Jr., Secretary.

Vulcan Iron and Nail Works, Chattanooga. Built in 1866; 1 double and 8 single puddling furnaces, 4 heating furnaces, 1 hammer, 30 nail machines, and 3 trains of rolls (one 8, and two 18-inch); product, merchant bar, light T rails, splice bars, and bolts, nails, railroad spikes, nuts, etc.; annual capacity, 8,000 net tons. F. I. Stone, Treasurer and Manager. *See Georgia Furnaces.*

Number of mills in Tennessee: 4. Of these, 3 roll rails, 2 making only light T and street rails.

OHIO.

LAKE COUNTIES.

Ashtabula Rolling Mill Co., Ashtabula, Ashtabula county. Built in 1873-4; 3 single puddling furnaces, 5 heating furnaces, 1 scrap furnace, 2 trains of rolls (20 x 84, and 21 x 44), 2 spike machines, 2 washer machines, and 2 shingle-band machines; product, all kinds of sheet iron, boiler plate, shingle bands, washers, and wrought spikes; annual capacity, 2,500 net tons. A. Dienst, Secretary, and Geo. Harris, Superintendent.

Cleveland Iron Works, Cleveland Iron Co., corner Water and Superior sts., Cleveland. Built in 1861; 19 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, and 1 hammer; product, rails, bar iron, splice bars, spikes and bolts; annual capacity, 40,000 net tons. Wm. Bingham, President; James Barnet, Vice-President; S. A. Fuller, Secretary and Treasurer. *See Furnaces.*

Cleveland Rolling Mill Co., Cleveland. Lake Shore Mill at Cleve-

land; built in 1852; 4 double puddling furnaces, 7 heating furnaces, and 2 trains of rolls; product, exclusively iron rails. Newburgh Mills at Newburgh, 6 miles from Cleveland; built in 1857; 20 heating furnaces and 10 trains of rolls; used almost exclusively for rolling Bessemer and Siemens-Martin steel and wire rods. Plate Mill at Cleveland; built in 1868; 6 single puddling furnaces and 4 trains of rolls. Bessemer Steel Works at Newburgh; built in 1867-8; made their first blow October 15, 1868; two 6-gross-ton converters. Siemens-Martin Steel Works at Newburgh; built in 1876; three 7-ton furnaces, having an annual capacity of 11,000 net tons. Wire Mill at Newburgh; built in 1868. Attached are a foundry, horse-shoe shop and forge. Product, wire, tire and spring steel, galvanized and black sheet iron, horse-shoes, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, and Bessemer steel and iron rails. Annual capacity, steel rails, 55,000 net tons; iron rails, 25,000 net tons; bar steel, 10,000 net tons; wire, 12,000 net tons; forgings, 1,000 net tons. H. Chisholm, President and General Manager; E. S. Page, Secretary; Superintendent, W. B. Chisholm; Vice-President and Manager of Eastern office, A. B. Stone, 52 William st., New York.

See Furnaces.

Lake Erie Iron Works, Lake Erie Iron Co., Cleveland. Built in 1852; 7 single and 3 double puddling furnaces, 4 scrap and 9 heating furnaces, 4 trains of rolls, and 9 hammers; product, steel axles, fagoted car and locomotive axles, iron and steel forgings of every description, and merchant bar iron; annual capacity, 12,000 net tons. W. C. Scofield, President; E. Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; James E. Lewis, Superintendent.

Nes Silicon Steel Works, Wm. T. West, Trustee, Sandusky, Erie county. Put in operation in October, 1873; 6 single puddling furnaces, 8 heating furnaces, 1 hammer, and 6 trains of rolls (3-high—one 7 and two 18-inch trains; and 2-high—one old-rail, and two puddle trains); product, railroad bars of iron or steel, and blooms; annual capacity, 30,000 net tons. For sale.

Standard Iron Co., Cleveland. Built in 1851; 7 single puddling and 6 knobbling furnaces, 3 heating furnaces, 4 trains of rolls, and 1 hammer; product, black and galvanized sheet iron; also make coal hods; annual capacity, 4,000 net tons. A. B. Hough, President; C. H. Tucker, Vice-President and Manager; C. L. Rhodes, Secretary and Treasurer. Formerly Cleveland Boiler Plate Manufacturing Co. Idle since December, 1876.

Union Iron Works, Union Iron Works Co., Cleveland. 30 puddling and 7 heating furnaces, 6 trains of rolls, and 2 squeezers; product, nuts,

bolts, guide and bar iron, and light T and street rails; annual capacity, 25,000 net tons. Specialty, refined bar iron. E. H. Bourne, President.

See Furnaces.

Valley Iron Co., Cleveland. Built in 1874-5; 1 double puddling furnace, 1 scrap furnace, 1 finishing furnace, 1 hammer, and 2 trains of rolls (one 9 and one 14-inch); product, merchant bar. Not in operation. Number of mills in the Lake region: 8. Of these, 4 roll rails, 1 making only light T and street rails.

MAHONING VALLEY.

Akron Iron Works, Akron Iron Co., Akron, Summit county. Built in 1866; 17 single puddling furnaces, 1 scrap furnace, 4 heating furnaces, and 3 trains of rolls; product, all kinds of bar iron, and light T rails from 10 to 30 lbs. per yard; specialty, iron for agricultural implements; annual capacity, 6,500 net tons. L. Miller, President; J. A. Long, Secretary; Joseph Corns, Managing Director. *See Hocking Valley Furnaces.*

Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863 and 1874; 30 single puddling furnaces, 9 heating furnaces, and 8 trains of rolls (one 6, one 7, two 8, one 10, one 16, and two 18-inch); product, hoop and band iron, and steel-mixed carriage tire; annual capacity, 10,000 net tons.

Falcon Iron and Nail Works, Falcon Iron and Nail Co., Niles, Trumbull county. Built in 1867; 12 single puddling and 3 heating furnaces, 44 nail machines, and 3 trains of rolls (one 8, one 18, and one 21-inch); product, nails and guide iron; annual capacity, 11,000 net tons. F. O. Arms, President; A. M. Robbins, Secretary and Treasurer.

Girard Rolling Mill, Girard, Trumbull county. Put in operation September 1, 1873; 13 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, all sizes of merchant bar, and a specialty of 8 and 12-lb. T rails; annual capacity, 7,000 net tons. Owned by Brier Hill Iron and Coal Co., Vienna Coal and Iron Co., and Evan Morris.

Grasshopper Works, John D. Wick, Youngstown. Built in 1876; 1 heating furnace, 1 train of rolls, and 2 spike machines; product, bar iron and spikes.

Hall Iron Works, Jesse Hall & Son, Hubbard, Trumbull county. Put in operation in November, 1872; 1 double and 6 single puddling furnaces, 2 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, 4,000 net tons.

James Iron Works, S. Matherson, lessee, Cuyahoga Falls, Summit county. Built in 1865; 1 heating furnace and one 8-inch train of rolls; water-power; product, bar iron; annual capacity, 1,200 net tons.

Mahoning Works, Brown, Bonnell & Co., Youngstown, Mahoning county. Built in 1846; 8 double and 38 single puddling furnaces, 11 heating furnaces, 42 nail machines, 1 hammer, 4 spike machines, and 3 trains of rolls (one 8, one 10, and one 18-inch); product, merchant bar, sheets, nails, and railroad and boat spikes; annual capacity, 25,000 net tons. Brand, "Mahoning." *See Mahoning Valley Furnaces.*

Niles Iron Works, Niles Iron Co., Niles, Trumbull county. Put in operation in September, 1872; 1 double and 20 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, bar, sheet, rod, skelp, and band iron; annual capacity, 12,000 net tons. L. G. Andrews, President, and L. E. Cochran, Secretary and Treasurer, Youngstown.

Ridgway Iron Works, Trustees of Ridgway Iron Co., Youngstown, Mahoning county. Built in 1871; 12 double puddling furnaces, 14 heating furnaces, and 6 trains of rolls (one 16, one 19, and four 20-inch); product, railroad and bar iron; annual capacity, 65,000 net tons. Idle since January, 1876.

Russia Sheet Iron Mills, L. B. Ward, Niles, Trumbull county. Built in 1864; 12 puddling and 4 heating furnaces, 5 nail machines, and 3 trains of rolls; product, sheet and plate iron, and nails; annual capacity, 7,500 net tons. Formerly part of the works of James Ward & Co.

Ward's Old Mill, Cleveland, Brown & Co., Niles, Trumbull county. Office, 25 Merwin st., Cleveland. Built in 1841; 19 puddling and 6 heating furnaces, and 5 trains of rolls; product, bar and sheet iron; annual capacity, 14,000 net tons.

Youngstown Rolling Mill, Youngstown Rolling Mill Co., Youngstown. Built in 1871; burnt and rebuilt in 1877; 12 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, hoop and band iron, charcoal horse-shoe bar, and compound steel buggy tire; annual capacity, 5,500 net tons. Paul Wick, President.

Number of mills in the Mahoning region: 13. Of these, 3 roll rails, 2 making only light T rails.

INTERIOR COUNTIES.

Cherry Valley Iron Co., Leetonia, Columbiana county. Formerly, Leetonia Iron and Coal Co. Built in 1871; 16 single puddling furnaces, 2 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. E. J. Warner, President and Superintendent; C. N. Schmick, Secretary and Treasurer. *See Furnaces.*

Columbus Iron Works, P. Hayden & Son, Columbus. Built in 1854; 12 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls;

product, merchant bars, splice bars, light T rails, wire of all kinds, and iron for harness and saddle work.

Columbus Rolling Mill, Columbus Rolling Mill Co., Columbus, Franklin county. Built in 1872; 14 single puddling furnaces, 12 heating furnaces, and 3 trains of rolls; product, rails; annual capacity, 30,000 net tons. Samuel Thomas, Treasurer and Superintendent.

Dover Rolling Mill, Tuscarawas Coal and Iron Co., 130 Water st., Cleveland. Works at Canal Dover, Tuscarawas county. Ten puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, bar iron and light T rails; annual capacity, 5,000 net tons. *See Furnaces.*

Massillon Coal and Iron Co., Massillon, Stark county. Built in 1873, and put in operation Jan. 4, 1875; 6 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 9 and two 18-inch); product, bar iron and light T rails; annual capacity, 6,000 net tons. S. Hunt, President; J. Coleman, Secretary; J. H. Hunt, Treasurer. For sale or to rent.

Newark Rolling Mill, Newark Iron Co., Newark, Licking county. Built in 1868; 12 single puddling furnaces, 6 heating furnaces, and 2 trains of rolls (one 9 and one 18-inch); built for a rail mill, but changed to a bar mill in 1875; product, bar iron. T. J. Davis, President.

Zanesville Iron Works, Ohio Iron Co., Zanesville, Muskingum county. Original mill built in 1848; present Company was incorporated in 1857, and has operated the works since then; 18 single puddling furnaces, 2 scrap furnaces, 8 heating furnaces, 2 spike machines, 5 trains of rolls (two 8, one 10, one 16, and one 18-inch); product, assorted merchant bar, angle and hoop iron, light T and street rails, and railroad spikes; annual capacity, 9,500 net tons. M. Churchill, President, and C. W. Greene, Secretary and Treasurer. *See Furnaces.*

Number of mills in Central Ohio: 7. Of these, 5 roll rails, 4 making light T rails only.

OHIO RIVER COUNTIES.

Ætna Iron and Nail Co., Bridgeport, Belmont county. Put in operation January 1, 1874; 13 single puddling furnaces, 1 scrap furnace, 6 heating furnaces, and 5 trains of rolls (one 9, one 16, one 18, and two 20-inch); product, bar, sheet, plate and band iron, and light T and street rails; annual capacity, 10,000 net tons. Has never made any nails. W. W. Holloway, President; W. H. Tallman, Secretary; Lewis Jones, Manager.

Alikanna Rolling Mill, (owned by Heirs of Joseph and A. J. Beatty,) leased by Flaccus & Daker Bros., Steubenville, Jefferson county. Built in 1871-2; 8 puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 15-inch); product, puddled steel, bar and hoop iron.

Belfont Iron Works, Belfont Iron Works Co., Ironton, Lawrence county.

Built in 1852; 19 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 80 nail machines; product, nails; annual capacity, 8,750 net tons. B. H. Burr, Secretary. *See Furnaces.*

Bellaire Nail Works, Bellaire, Belmont county. Built in 1868; 21 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 90 nail machines; product, nails and spikes; annual capacity, 12,000 net tons. C. Oglebay, President; A. D. Hilborn, Secretary; S. E. Montgomery, Manager. *See Furnaces.*

Bloom Forge Iron Works, Gaylord Rolling Mill Co., Portsmouth, Scioto county. Built in 1832; 6 charcoal fires, 1 run-out, 2 double and 14 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 2 hammers; product, boiler, bar, sheet, and hoop iron, rivets, blooms, railroad chairs, splice bars, and track bolts, and railroad and boat spikes; annual capacity, 7,500 net tons. B. B. Gaylord, President; George B. Bradley, Secretary; Thomas J. Adams, General Superintendent.

Burgess Steel and Iron Works, Portsmouth. Built in 1871; 12 single puddling furnaces, 9 heating furnaces, 3 trains of rolls (one 8, one 18, and one 20-inch), 2 steam hammers, and 8 steel-melting holes; product, plow steel (German and cast), boiler plate (steel and U. S. Norway), and U. S. Norway and gun-iron shapes, all sizes; annual capacity, 5,000 net tons. J. R. Williams, President; G. W. Weyer, Secretary; M. H. Ball, Treasurer.

Cincinnati Railway Iron Works, Cincinnati Railway Iron Co., Cincinnati, Hamilton county. Built in 1864; 9 Danks rotary puddling furnaces, 10 heating furnaces, two 21-inch trains of rolls, and one 5-ton hammer; product, rails; annual capacity, 15,000 net tons. Idle since 1874.

Empire Rolling Mill, Wilder, Boluss & Co., Cincinnati. First put in operation August 1, 1875; 2 heating furnaces, and 2 trains of rolls (one 10 and one 16-inch); product, bar iron; annual capacity, double turn, 4,000 net tons. Removed here from Seymour, Indiana. Idle since January 1, 1876.

Eureka Steel and Iron Works, Black, Daker & Co., Wellsville, Columbiana county. Product, plow and shovel steel, steel boiler plate, and flanging iron. Brands, "Eureka," and "B. D. & Co."

Globe Rolling Mill, Globe Rolling Mill Co., 42 and 44 West Second st., Cincinnati. Built in 1845; 9 single puddling furnaces, 5 heating and 3 scrap furnaces, 1 hammer, and 5 trains of rolls (two 8, one 12, and two 18-inch); product, bars, sheets, plates, angles, all guide irons, wire rods and wire, and scrap steel for plow and other uses; annual ca-

capacity, single turn, 6,000 net tons. Joseph Kinsey, President; J. L. Boyer, Vice-President; J. Walter, Secretary.

Ironton Rolling Mill, Iron and Steel Co., Ironton, Lawrence county. Built in 1852, and enlarged several times since; 21 single puddling furnaces, 8 heating furnaces, and 5 trains of rolls. The steel department is operated on the Burgess principle, which converts the metal into steel in the boiling (or puddling) furnace; hence as many boiling furnaces can be used in the manufacture of steel as trade requires. Product, merchant iron; light rails, and agricultural and machine steel; annual capacity, single turn, 9,000 net tons, double turn, 15,000 tons. E. McMillin, President; John Campbell, Vice President; Daniel R. Wolfe, Secretary and Treasurer. *See Furnaces.*

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 22 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 85 nail machines; product, nails; annual capacity, 10,000 net tons. Brand, "Jefferson Iron Works." David Spaulding, President; Calvin B. Doty, Vice-President; C. H. Spaulding, Secretary; Wm. R. E. Elliott, Superintendent. *See Furnaces.*

Laughlin Nail Co., Wheeling, W. Va. Works at Martin's Ferry, Belmont county. Built in 1873-4; 10 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 50 nail machines; first keg of nails made on March 4, 1874; product, nails; annual capacity, 6,250 net tons. Formerly, Ohio City Iron and Nail Works. Alexander Laughlin, President; W. L. Glessner, Secretary; A. L. Wetherald, Supt.

Lawrence Iron Works, Lawrence Iron Works Co., Ironton. Built in 1853; 18 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 8, one 9, one 16, and one 18-inch); product, bar, band, chair, spike and hoop iron of every variety, cotton ties, and light T rails from 8 to 30 lbs.; annual capacity, 8,000 net tons. Specialties, chain iron, iron fencing, concave tire, and cotton ties. Cyrus Ellison, President; E. McMillin, General Superintendent; Geo. T. Scott, Secretary and Treasurer.

Marietta Rail Mill, Estate of Wm. Lottimer, Marietta, Washington county. Built in 1867; 12 single puddling furnaces, 9 heating furnaces, 4 trains of rolls, and 1 squeezer; product, rails, fish plate, and bar, hoop, and bridge iron; annual capacity, 30,000 net tons. Idle since 1876. Agent, Hildreth Bloodgood, of John Bloodgood & Co., bankers, New York.

Pioneer Rolling Mill, Hale & Doolittle, Chicago. Works at Irondale, Jefferson county. 10 double puddling furnaces and 2 trains of rolls; product, muck bar; annual capacity, 9,000 net tons. Formerly, part of the Alliance Rolling Mill Co.'s establishment. *See Furnaces.*

Pomeroy Iron Works, Pomeroy Iron Co., Pomeroy, Meigs county. Built in 1847; 16 single puddling furnaces, 4 heating furnaces, 5 trains of rolls, and 16 nail machines; product, bar, band, and hoop iron, rounds and squares, light T and flat rails, nails, and boat and cut spikes; annual capacity, 10,500 net tons. V. B. Horton, President; J. W. Thomas, Secretary and Treasurer; Dr. A. L. Norton, Agent.

Vulcan Iron and Tube Works, Evans, Clifton & Co., Cincinnati. Built in 1864; 7 single puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 8, one 18, and one 19-inch); product, bar, rod, band, and sheet iron; annual capacity, 4,500 net tons.

Number of mills in the Ohio river counties: 18. Of these, 6 roll rails, 4 making only light T and flat rails. Total number of mills in Ohio: 46. Of these, 18 roll rails, 11 making only light T and flat rails.

INDIANA.

Aurora Iron Mills, Aurora Iron and Nail Co., Aurora, Dearborn county. Built in 1875-8; 10 single puddling furnaces, 12 heating furnaces, 42 nail machines, 1 hammer, 3 nut machines, 3 nut furnaces, and 5 trains of rolls (22-inch sheet and plate train, 16-inch bar, 16-inch muck, 8-inch train, and 20-inch nail plate); product, sheet, plate, tank, hoop, band, and bar iron, hot-pressed nuts, patent cut-nails, and bridge bolts; annual capacity, 14,000 net tons. O. P. Cobb, President; T. H. Johnson, Vice-President; H. S. Campbell, Secretary; L. M. Foulk, Treasurer; John D. Dwyer, Superintendent.

Capital City Iron Works, Capital City Iron Co., Indianapolis, Marion county. One scrap furnace, 11 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one puddle train, one 8-inch guide, and one 15-inch bar); product, bar iron, hoop iron, splice bars, light T rails, and bridge iron; annual capacity, 5,400 net tons. V. Bulich, President.

Crescent City Rolling Mill Co., Evansville, Vanderburgh county. Built in 1872, and put in operation in June, 1873; 16 single puddling furnaces, 9 heating furnaces, and three 21-inch trains of rolls; product, rails; annual capacity, 25,000 net tons. Formerly called the Evansville Rolling Mill Co. C. E. Scoville, Secretary.

Greencastle Iron and Nail Co., Greencastle, Putnam county. Put in operation in January, 1868; 12 single puddling furnaces, 3 heating furnaces, 1 annealing furnace, two 18-inch trains of rolls, and 33 nail machines; product, nails and spikes; annual capacity, 2,250 net tons. J. F. Darnall, President; H. M. Thomas, Superintendent of works; G. H. Brown, Secretary and Treasurer.

Indianapolis Rolling Mill, Indianapolis Rolling Mill Co., 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 and splice bars; annual capacity, 30,000 net tons. Aquilla Jones, President; C. B. Parkman, Secretary; W. O. Rockwood, Treas.
- New Albany Rail Mill Co., New Albany, Floyd county. Built in 1864; 5 double and 6 single puddling furnaces, 10 heating furnaces, and 4 trains of rolls; product, fish bars and 12 to 65 lb. rails; annual capacity, 25,000 net tons. W. C. DePauw, President, and Albert Trinler, Manager.
- Ohio Falls Iron Works, New Albany. Built in 1866; 15 single puddling furnaces, 3 heating furnaces, 3 trains of rolls (18-inch muck, 16-inch bar, and 8-inch guide), and 20 nail machines; product, bridge and bar iron, stay bolt iron, nails and railroad spikes; annual capacity, 7,500 net tons. W. C. DePauw, President; Peter R. Stoy, Vice-President, Treasurer and General Manager; Edward M. Hubbert, 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; new works have 70 nail machines, 16 single puddling furnaces, 2 scrap furnaces, 4 heating furnaces, and 2 trains of rolls; product, nails; use Coyne's picker; annual capacity, 180,000 kegs, or 9,000 net tons. F. Nippert, President, and Samuel L. Bridwell, Secretary.
- Wabash Iron Co., Terre Haute. Completed in January, 1874; 10 single puddling furnaces, 1 scrap furnace, 5 heating furnaces, and 3 trains of rolls (one 8, one 18, and one 20-inch); product, all kinds of bar and guide iron; annual capacity, 6,000 net tons. Brand, "Wabash." A. J. Crawford, President, and J. P. Crawford, Secretary and Treasurer.
- Western Iron Co., Knightsville, Clay county. Built in 1868; 5 double and 7 single puddling furnaces, and 1 train of rolls; product, muck bar; annual capacity, 10,000 net tons. *See Furnaces.*
- Number of mills in Indiana: 10. Of these, 4 roll rails, 1 making only light T rails.

ILLINOIS.

- Belleville Nail Works, J. C. Waugh & Bros., Belleville, St. Clair county. Built in 1871; use 2 boiling or puddling furnaces, 6 heating furnaces, 2 trains of rolls, and 48 nail machines; product, all kinds of cut nails; annual capacity, 7,000 net tons. Make nails out of old rails under W. H. Powell's patent, No. 189,495. General Manager, W. H. Powell.
- Centralia Iron and Nail Works, Centralia, Marion county. Building in 1878; 8 single puddling furnaces, 2 heating furnaces, 32 nail machines, and 2 trains of rolls; product, to be nails. S. M. Warner, President;

- E. B. Marshall, Vice-President ; R. D. Noleman, Secretary ; J. Kohl, Treasurer ; John Lundy, Manager.
- Chicago Plate and Bar Mill Co., Chicago. Two boiling furnaces, 4 forge fires, 2 scrap furnaces, 2 plate furnaces, 2 annealing furnaces, 4 trains of rolls, and 1 hammer ; product, plate and bar iron. Idle and for sale.
- East St. Louis Rail Mill, East St. Louis, St. Clair county. Owned by G. B. Allen, O. B. Filley, and Adolphus Meier, of St. Louis. Built in 1865 ; 6 double puddling furnaces, 8 heating furnaces, and 3 trains of rolls (one 14, one 18, and one 20-inch) ; product, light and heavy T rails ; annual capacity, 20,000 net tons.
- Joliet Iron and Steel Works, Joliet Iron and Steel Co., 95 Dearborn st., Chicago. Works at Joliet, Will county. Built in 1870 ; made the first blow in their steel works January 26, 1873, and the first steel rail March 15, 1873 ; puddle mill has 9 double puddling furnaces and 1 double heating furnace, one 16 and one 21-inch train of rolls, and 1 squeezer ; iron rail mill has 8 heating furnaces, and 3 trains of 21-inch, 3-high rolls ; the Bessemer steel works have two 6½-gross-ton converters, 2 double Siemens heating furnaces, one 30-inch blooming train, and 3 trains of 23-inch rolls ; product, iron and Bessemer steel rails ; annual capacity, 50,000 net tons steel ingots, and 95,000 net tons iron and steel rails. Alex. J. Leith, Receiver ; H. S. Smith, General Superintendent. *See Furnaces.*
- Joseph H. Brown Iron and Steel Co., Joseph H. Brown & Co., lessees, 180 Dearborn st., Chicago. First put in operation in August, 1876 ; 6 double puddling furnaces, 2 scrap and 5 heating furnaces, 4 trains of rolls, and 75 nail machines ; product, merchant bar and nails ; annual capacity, 15,000 net tons.
- North Chicago Rolling Mill, North Chicago Rolling Mill Co., Chicago. Built in 1857 ; 7 double and 7 single puddling furnaces, 26 single and 3 double heating furnaces, 10 trains of rolls, and 1 hammer ; Bessemer steel works have two 6-gross-ton converters and all the appliances for making rails ; made their first blow April 10, 1872 ; product, Bessemer steel ingots, and iron and Bessemer steel rails ; annual capacity, 50,000 net tons steel rails, and 50,000 tons iron rails. O. W. Potter, President, Chicago ; S. P. Burt, Vice-President, New Bedford, Mass. ; S. Clement, Treasurer, Milwaukee, Wis. ; R. C. Hannah, Secretary, Chicago. *See Furnaces. See Wisconsin Furnaces and Rolling Mills.*
- Northwestern Nail Works, J. T. Walker (Lancaster, Wisconsin), Dunleith, Jo Daviess county. Built in 1875-6 ; 2 heating furnaces, 2 trains of rolls, and 6 nail machines ; product, nails and spikes ; annual capacity, 2,000 net tons.
- Springfield Iron Works, Springfield Iron Co., Springfield, Sangamon

county. Put in operation Sept. 13, 1872; 6 double puddling furnaces, 6 Siemens double reheating furnaces, 1 ordinary reheating furnace, 1 hammer, one 23-inch train of rolls with 3 stands, and one 18-inch train with 2 stands and squeezer attached; product, rails and fastenings; annual capacity, 40,000 net tons of rails, and 10,000 net tons of fish plates, bolts and nuts. Steel works now building, to contain 2 Siemens-Martin furnaces, with an auxiliary furnace and necessary gas producers. Charles Ridgely, President; John W. Bunn, Vice-President; Geo. M. Brinkerhoff, Secretary.

St. Louis Bolt and Iron Co., Third and Chestnut sts., St. Louis, Mo. Works in St. Clair county, Illinois. Put in operation in January, 1873; 2 single and 2 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, 3 spike machines, 1 bolt header, 3 bolt cutters, and 2 nut tappers; reroll Bessemer steel; product, bar iron, light T and street rails, fish plates, bolts, washers and spikes, and Bessemer steel tire, fish plates, etc. T. A. Meysenburg, President; Geo. B. Emmons, Secretary; Geo. S. Edzell, Treasurer; O. W. Meysenburg, Manager.

Union Rolling Mill, Union Rolling Mill Co., Chicago. Built in 1863; 12 heating furnaces, 1 train of flat rolls, 1 rail train, and 1 hammer and a blooming train for steel ingots; the Bessemer steel works have two 6-gross-ton converters, 4 cupolas and 2 spiegel-melting furnaces; made their first blow July 26, 1871; product, iron and Bessemer steel rails; total annual capacity, 50,000 net tons. A. B. Stone, President, 52 William st., New York; W. H. Chisholm, Vice-President and Manager; J. B. Stubbs, Secretary. *See Furnaces.*

Number of mills in Illinois: 10 completed mills, and 1 building. Of these, 6 roll rails, 1 making light rails only.

MICHIGAN.

Baugh Steam Forge Co., Detroit, Wayne county. Forge built in 1870; rolling mill, in 1877; 6 heating furnaces, 5 hammers, and 2 trains of rolls (one 8 and one 16-inch); product, car axles, links and pins, shafting, and bar iron. John S. Newberry, President; James McMillan, Treasurer; Hugh McMillan, Secretary; John B. Baugh, Manager.

Jackson Iron Manufacturing Co., Jackson, Jackson county. Built in 1872; put in operation in March, 1873; 4 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, bar iron; annual capacity, 3,000 net tons. Idle since 1874.

Marquette Rolling Mill, Marquette and Pacific Rolling Mill Co., Marquette, Marquette county. Built in 1871; 2 double and 6 single puddling furnaces, 1 heating furnace and 2 trains of rolls; product, bar iron; annual capacity, 4,500 net tons. E. A. Elliott, President, De-

troit; Jno. Scudder, Secretary; W. W. Wheaton, Agent. Idle since 1873. *See Furnaces.*

Wyandotte Rolling Mills, Eureka Iron Co., lessee, Detroit. Works at Wyandotte, Wayne county. Built in 1855; 2 double and 9 single puddling furnaces, 12 forge fires, 16 heating furnaces, 7 trains of rolls (one 30, three 24, one 20, one 18, and one 8-inch), and 1 hammer; product, plate and tank iron, bars, sheets, and rails; annual capacity, 25,000 net tons. *See Furnaces.*

Number of mills in Michigan: 4. Of these, 1 rolls rails.

WISCONSIN.

Bay View Iron Works, North Chicago Rolling Mill Co., Chicago. Works at Bay View, near Milwaukee, Milwaukee county. Built in 1868 and 1874; 16 double and 2 single puddling furnaces, 25 heating furnaces (in part Siemens furnaces), 7 trains of rolls, and 1 hammer; product, rails, merchant bar iron, fish plates, car links and pins, and horse-shoes; annual capacity, 44,800 net tons of rails, 15,000 tons merchant bar iron, and 10,000 tons fish plates, etc. Formerly Milwaukee Iron Works. *See Furnaces. See Illinois Furnaces and Rolling Mills.*

Number of mills in Wisconsin: 1 rail mill.

MISSOURI.

Harrison Wire Works, Harrison Wire Co., St. Louis. Built and started in 1873; 1 single and 1 double puddling furnace, 4 heating furnaces, 2 blooming fires, 1 hammer, 162 wire blocks, and one 18-inch and one 8-inch train of rolls; product, iron wire and wire-mill specialties; annual capacity, 5,000 net tons. Thos. W. Fitch, President and Treasurer; Charles Fish, Secretary.

Helmbacher Forge and Rolling Mills, 818 and 820 N. Second st., St. Louis. Built in 1858; 7 single puddling furnaces, 9 heating furnaces, 2 trains of rolls, and 5 hammers; product, bar, rod, band, and angle iron, car axles, light T rails from 12 to 25 lbs., and all kinds of forgings for railroad and steamboat use; specialties, iron for car works, railroad and machine shops, and bridges; car axles are the leading forgings; annual capacity, 10,000 net tons. M. Helmbacher, President; A. Helmbacher, Treasurer and Superintendent; G. L. Goetz, Secretary.

Laclede Rolling Mill, Chouteau, Harrison & Vallé, 941 N. Second st., St. Louis. Built in 1850; 1 double and 18 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls; product, flat rails, bar, sheet, and plate iron, rail fastenings, and blooms; annual capacity, 12,000 net tons. Edwin Harrison, President; Charles C. Maffitt, Vice-President; Paul A. Fußz, Secretary.

St. Louis Steam Forge and Iron Works, A. McDonald & Bro., corner Main and Miller sts., St. Louis. Built in 1862; 3 double puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 2 hammers; product, railroad work, car axles, cranks, connecting rods, frames, pedestals, locomotive forgings, and every description of steamboat work, such as cranks, shafts, etc.; annual capacity of rolling mill, 4,800 net tons, and of forgings, 1,800 net tons.

Tudor Iron Works, St. Louis Rail Fastening Co., P. O. Box 2,863, St. Louis. Built in 1870; 3 heating furnaces, 2 trains of rolls, and 3 spike machines; product, spikes, bolts, fish plates, and merchant iron; annual capacity, 6,000 net tons. J. G. Chatman, President; J. B. Beach, Vice-President and Treasurer; Geo. E. Leighton, Secretary.

Vulcan Iron Works, 221 Olive st., St. Louis. Built in 1872; 18 double and 2 single puddling furnaces, 17 heating furnaces, and three 22-inch trains of rolls; product, iron and Bessemer steel rails. Bessemer steel works made their first blow September 1, 1876; two 7-gross-ton converters; 3 pig iron cupolas, 40 x 8; 4 spiegel-melting furnaces, 40 x 5; two 12-ton cupola ladles; 12 gas producers and 3 heating furnaces; one 3-ton hammer. D. K. Ferguson, President; D. R. Garrison, Vice-President; O. L. Garrison, Secretary and Treasurer; D. E. Garrison, Manager. *See Furnaces.*

Number of mills in Missouri: 6. Of these, 3 roll rails, 2 making light rails only.

KANSAS.

Kansas Rolling Mill Company, Rosedale, Wyandotte county. Works are 3 miles from Kansas City, Missouri; composed of the plant that was formerly at Decatur, Illinois, having been removed and rebuilt in 1875; it was first erected in 1870; has 9 heating furnaces and works 2 trains of rolls (one 17 and one 20-inch); product, iron rails and fish plates; annual capacity, 28,000 net tons rails, and 3,000 net tons fish plates. A. B. Stone, President, 52 William st., New York; W. H. Harris, Vice-President, Cleveland, Ohio; Ira Harris, Jr., Manager and Treasurer, Rosedale, Kansas; E. V. Wilkes, Secretary, Kansas City, Mo.

Topeka Rolling Mill Co., Topeka, Shawnee county. First put in operation May 26, 1874; 6 heating furnaces and one train of 19-inch rolls; product, rails; annual capacity, 20,000 net tons.

Number of mills in Kansas: 2 rail mills.

COLORADO.

Pueblo Iron Co., Pueblo, Pueblo county. Removed from Danville, Pa., in 1877, and first put in operation at Pueblo on March 1, 1878; 4 heat-

ing furnaces and 2 trains of rolls; product, rails; annual capacity, 9,000 net tons. Wm. Faux, President, and Wm. J. Faux, Secretary and Treasurer. A blast furnace, puddle mill, bar mill, and nail factory are projected in connection with these works.

Number of mills in Colorado: 1 rail mill.

WYOMING TERRITORY.

Union Pacific Rolling Mills, Union Pacific Railroad Co., Laramie City, Albany county. Built in 1874-5; put in operation in April, 1875; 8 heating furnaces and 1 train of rolls; product, rails; reroll old rails; daily make, 55 gross tons, single turn; annual capacity, single turn, 15,000 net tons. J. H. Brazier, Superintendent.

Number of mills in Wyoming Territory: 1 rail mill.

UTAH TERRITORY.

Ogden Iron Works, Equitable Iron and Coal Co., Ogden City. Mill began to be built in 1875; then discontinued for some time, and work resumed in 1878; to contain one 22-inch train of rolls and a guide mill; water-power; will make rails, nail plate and muck bar. President, W. G. Case; Secretary, J. Alliene Case; Manager, James D. Case. *See Furnaces.*

Number of mills in Utah Territory: 1 rail mill building.

CALIFORNIA.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Co., 3 and 5 Front st., San Francisco. P. O. Box, 2,032. Put in operation July 25, 1868; 3 single puddling furnaces, 15 heating furnaces, 6 trains of rolls, 3 spike and 2 rivet machines, 4 bolt headers, 1 pointer, 3 hot-press nut machines, 10 punching and straightening presses, 7 steam hammers, and 2 belt hammers; product, bar iron, angle iron, shafting, 12 to 60 lb. rails, railroad, ship and boat spikes, bridge work, bolts, (all kinds except carriage,) nuts, washers, boiler rivets, horse-shoe shapes, car axles, and all kinds of railroad and ship forgings; annual capacity, 30,000 net tons. Wm. Alvord, President; B. P. Brunner, Vice-President and Superintendent; L. B. Benchley, General Manager; C. M. Keeney, Secretary and Treasurer; Patrick Noble, Assistant Superintendent.

Number of mills in California: 1 rail mill.

Number of mills in the United States: 340 completed establishments, and 3 building. Of these, 93 roll rails, 35 making only light T and street rails; and 1 rail mill is building.

RAIL MILLS.

LIST OF ROLLING MILLS WHICH MAKE LIGHT AND HEAVY SECTIONS OF
RAILROAD BARS AND STREET RAILS.

NOTE.—For a complete description of the works enumerated below see the preceding list of rolling mills. When not otherwise specified, the mills in this list roll only ordinary sections of iron rails.

MAINE.

Portland Rolling Mill, Portland Rolling Mill Co., Portland.

Total in Maine: 1 rail mill.

VERMONT.

St. Albans Iron and Steel Works, St. Albans Iron and Steel Co., St. Albans, Franklin county.

Total in Vermont: 1 rail mill.

MASSACHUSETTS.

Bay State Iron Works, Bay State Iron Co., Boston.

Washburn Iron Works, Washburn Iron Co., Worcester.

Total in Massachusetts: 2 rail mills.

NEW YORK.

Albany and Rensselaer Iron and Steel Co., Troy, Rensselaer county.
Iron and Bessemer steel rails.

Buffalo Iron and Nail Works, Pratt & Co., Buffalo, Erie county. Street rails.

Delano Iron Works, Delano Iron Co., Syracuse, Onondaga county.

Elmira Iron and Steel Rolling Mills, Elmira Iron and Steel Rolling Mill Co., Elmira, Chemung county. Iron and silicon-steel-top rails.

Rome Iron Works, Rome Iron Co., Rome, Oneida county.

Spuyten Duyvil Rolling Mill, Spuyten Duyvil Rolling Mill Co., Spuyten Duyvil, Westchester county.

Union Iron Works, Union Iron Co., Buffalo.

Total in New York: 7 rail mills, of which 1 rolls only street rails.

NEW JERSEY.

New Jersey Steel and Iron Co., Trenton, Mercer county. Cooper, Hewitt & Co., 17 Burling Slip, New York.

Total in New Jersey: 1 rail mill.

PENNSYLVANIA—EASTERN DISTRICT.

Allentown Rolling Mill Co., Allentown, Lehigh county. Office, 303 Walnut st., Philadelphia. All sizes of T rails and street rails.

Bethlehem Iron Co., Bethlehem, Northampton county. Iron and Bessemer steel rails.

Glen Iron Works, Allentown, Lehigh county. Light rails.

Little Schuylkill Rolling Mill, James A. Inness, Port Clinton, Schuylkill county. Light rails.

Palo Alto Rolling Mill, Estate of Benjamin Haywood, Pottsville, Schuylkill county. Rails of light and heavy sections and street rails.

Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Co., W. E. C. Coxe, Supt., Reading, Berks county.

Philadelphia Iron and Steel Co., 939 North Delaware avenue, Philadelphia. Street rails.

Phoenix Iron Co., Phoenixville, Chester county. Office, 410 Walnut st., Philadelphia.

Pottsville Rolling Mills, Atkins Brothers, Pottsville. Rails of light and heavy sections and street rails.

Schuylkill Haven Rolling Mill and Spike Manufacturing Co., William Weissinger, Schuylkill Haven, Schuylkill county. Light rails.

Number in Eastern Pennsylvania: 10 rail mills, of which 4 roll only light and street rails.

PENNSYLVANIA—CENTRAL DISTRICT.

Columbia Steel and Iron Works, Wm. J. Howard, Columbia, Lancaster county.

Co-operative Iron and Steel Works, Danville, Montour county. All sizes of T and street rails.

Glendower Iron Works, A. Creveling, Danville. All sizes of T and street rails.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Co., Hollidaysburg, Blair county. Light rails.

Lackawanna Iron Works, Lackawanna Iron and Coal Co., Scranton, Lackawanna county. Iron and Bessemer steel rails.

Lochiel Rolling Mill Co., Harrisburg.

Pennsylvania Iron Works, Waterman & Beaver, Danville. Office, 407 Library st., Philadelphia.

Pennsylvania Steel Works, Pennsylvania Steel Co., Steel Works P. O., Baldwin Station, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel rails of all kinds.

Safe Harbor Rolling Mill, Phoenix Iron Co., Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. Not in operation for several years.

Number in Central Pennsylvania: 9 rail mills, of which 1 rolls only light rails.

PENNSYLVANIA—WESTERN DISTRICT.

American Iron Works, Jones & Laughlins, Pittsburgh, Allegheny county. Light rails.

Brady's Bend Iron Co., Brady's Bend, Armstrong county. Not in operation for several years.

Cambria Iron Works, Cambria Iron Co., Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Iron and Bessemer steel rails.

Fort Pitt Iron and Steel Works, John Graff, Pittsburgh. Light rails.

Edgar Thomson Steel Works, Edgar Thomson Steel Co. Limited, Bessemer Station, Allegheny county. Office at Pittsburgh. Bessemer steel rails.

Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Light rails.

Old Fort Iron Works, Jones, Lewis & Co., Brownsville, Fayette county. Light rails.

Sharon Iron and Nail Works, Westerman Iron Co., Sharon, Mercer county. Light rails.

Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence county. Light rails.

Sligo Iron Works, Phillips, Nimick & Co., Pittsburgh. Light rails.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Light rails.

Wheatland Rolling Mills, B. B. Reath, 1538 Pine st., Philadelphia. Works at Wheatland, Mercer county. Not in operation for several years.

Number in Western Pennsylvania: 12 rail mills, of which 8 roll only light rails. Total in Pennsylvania: 31 rail mills, of which 13 roll only light and street rails.

MARYLAND.

Abbott Iron Works, Abbott Iron Co., Baltimore.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Co., Cumberland.

Total in Maryland: 2 rail mills.

GEORGIA.

Atlanta Rolling Mill, Atlanta Rolling Mill Co., Atlanta.

Total in Georgia : 1 rail mill.

WEST VIRGINIA.

Crescent Iron Works, Whitaker Iron Co., Wheeling.

Riverside Iron Works, Wheeling. Light rails.

Total in West Virginia : 2 rail mills, of which 1 rolls only light rails.

KENTUCKY.

Covington Rolling Mill, James G. Kyle & Bro., Covington. Office, Cincinnati.

Kentucky Rolling Mill, Louisville. Light and street rails.

Louisville Rolling Mill, Louisville Rolling Mill Co., Louisville. Light and street rails.

Swift's Iron and Steel Works, Newport. Office, Cincinnati. Light and street rails.

Total in Kentucky : 4 rail mills, of which 3 roll only light and street rails.

TENNESSEE.

Roane Iron Works, Roane Iron Co., Chattanooga.

Tennessee Iron and Steel Co., Chattanooga. Light rails.

Vulcan Iron and Nail Works, Chattanooga. Light rails.

Total in Tennessee : 3 rail mills, of which 2 roll only light rails.

OHIO.

Ætna Iron and Nail Co., Bridgeport, Belmont county. Light and street rails.

Akron Iron Works, Akron Iron Co., Akron, Summit county. Light rails.

Cincinnati Railway Iron Works, Cincinnati Railway Iron Co., Cincinnati. Not in operation for several years.

Cleveland Iron Works, Cleveland Iron Co., Cleveland.

Cleveland Rolling Mill Co., Cleveland. Lake Shore and Newburgh Mills. Iron and Bessemer steel rails.

Columbus Iron Works, P. Hayden & Son, Columbus. Light rails.

Columbus Rolling Mill, Columbus Rolling Mill Co., Columbus.

Dover Rolling Mill, Tuscarawas Coal and Iron Co., Canal Dover, Tuscarawas county. Light rails.

Girard Rolling Mill, Girard, Trumbull county. Light rails.

Ironton Rolling Mill, Iron and Steel Co., Ironton, Lawrence county.
Light rails.

Lawrence Iron Works, Lawrence Iron Works Co., Ironton. Light rails.

Marietta Rail Mill, Estate of Wm. Lottimer, Marietta, Washington county.

Massillon Coal and Iron Co., Massillon. Light rails.

Nes Silicon Steel Works, Wm. T. West, Trustee, Sandusky, Erie county.

Pomeroy Iron Works, Pomeroy Iron Co., Pomeroy, Meigs county.
Light and street rails.

Ridgway Iron Works, Trustees of Ridgway Iron Co., Youngstown.

Union Iron Works Co., Cleveland. Light and street rails.

Zanesville Iron Works, Ohio Iron Co., Zanesville. Light and street rails.

Total in Ohio: 18 rail mills, of which 11 roll only light and street rails.

INDIANA.

Capital City Iron Works, Capital City Iron Co., Indianapolis. Light rails.

Crescent City Rolling Mill Co., Evansville.

Indianapolis Rolling Mill, Indianapolis Rolling Mill Co., Indianapolis.

New Albany Rail Mill Co., New Albany.

Total in Indiana: 4 rail mills, of which 1 rolls only light rails.

ILLINOIS.

East St. Louis Rail Mill, East St. Louis, St. Clair county.

Joliet Iron and Steel Works, Joliet Iron and Steel Co., Joliet, Will county. Office, 95 Dearborn st., Chicago. Iron and Bessemer steel rails.

North Chicago Rolling Mill, North Chicago Rolling Mill Co., Chicago.
Iron and Bessemer steel rails.

Springfield Iron Works, Springfield Iron Co., Springfield, Sangamon county.

St. Louis Bolt and Iron Co., St. Louis, Mo. Works in St. Clair county, Illinois. Light rails and street rails.

Union Rolling Mill, Union Rolling Mill Co., Chicago. Iron and Bessemer steel rails.

Total in Illinois: 6 rail mills, of which 1 rolls only light and street rails.

MICHIGAN.

Wyandotte Rolling Mills, Eureka Iron Co., Wyandotte, Wayne county.
Office at Detroit.

Total in Michigan: 1 rail mill.

WISCONSIN.

Bay View Iron Works, North Chicago Rolling Mill Co., Milwaukee.
Office at Chicago.

Total in Wisconsin : 1 rail mill.

MISSOURI.

Helmbacher Forge and Rolling Mills, St. Louis. Light rails.

Laclede Rolling Mill, Chouteau, Harrison & Vallé, St. Louis. Street rails.

Vulcan Iron Works, St. Louis. Office, 221 Olive st. Iron and Bessemer steel rails.

Total in Missouri : 3 rail mills, 2 of which roll only light and street rails.

KANSAS.

Kansas Rolling Mill Co., Rosedale. Office, Kansas City, Missouri.

Topeka Rolling Mill Co., Topeka.

Total in Kansas : 2 rail mills.

COLORADO.

Pueblo Iron Co., Pueblo, Pueblo county.

Total in Colorado : 1 rail mill.

WYOMING TERRITORY.

Union Pacific Rolling Mills, Union Pacific Railroad Co., Laramie City.

Total in Wyoming Territory : 1 rail mill.

UTAH TERRITORY.

Ogden Iron Works, Equitable Iron and Coal Co., Ogden City. In course of erection.

Total in Utah Territory : 1 rail mill building.

CALIFORNIA.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Co., San Francisco.
Rails of all sizes.

Total in California : 1 rail mill.

UNITED STATES.

Total in the United States : 93 completed rail mills, of which 35 roll only light and street rails ; and 1 rail mill in course of erection.

RECENTLY ABANDONED ROLLING MILLS.

MASSACHUSETTS.

Dighton Rolling Mill, Dighton Rolling Mill Co., Dighton, Bristol county.

Built in 1866; destroyed by fire in 1869, and not rebuilt.

New England Iron Co., Readville, Norfolk county. Built in 1862; product, bar iron, gas plates and shapes; annual capacity, 8,000 net tons. Owned by Wm. E. Coffin & Co., of Boston, who have sold the machinery and torn down the building.

CONNECTICUT.

Hunt Canfield Iron Co., Huntsville, Litchfield county. Destroyed by fire, and not rebuilt.

NEW YORK.

James Suffern, Suffern P. O., Rockland county. Built in 1850; product, bars.

NEW JERSEY.

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; annual capacity, 2,000 net tons.

North River Rolling Mill, Alex. C. Durbin, Thirteenth and Henderson sts., Jersey City. Product, fire-box and boiler plate; annual capacity, 3,000 net tons; average yearly production, 1,500 tons. Torn down in 1875.

PENNSYLVANIA.

Colemanville Rolling Mill, Colemanville, Lancaster county. Burned in 1875.

Juniata Iron Works, S. & B. R. Hatfield, Alexandria, Huntingdon county. Built in 1838; product, sheet, plate, and bar iron; burned in 1868.

Stony Creek Iron Works, Norristown, Montgomery county. Built in 1849; product, bar, sheet, and boiler plate. Made their last iron in 1874. Owned by J. H. Boone and Jonathan Hefle, of Reading.

MARYLAND.

Mount Savage Iron Co., Mount Savage, Alleghany county. Built in 1839;

product, rails. Abandoned several years ago, and completely dismantled in 1875.

NORTH CAROLINA.

Briggs's Rolling Mill, Gaston county. Built in 1853; has been standing for several years.

SOUTH CAROLINA.

Magnetic Iron Co., Limestone Springs P. O., Spartanburg county. Works on Proud river, Union county. F. G. Latham, Agent. Organized about 1840; rolling mill, nail works, forge, foundry, and 4 blast furnaces, each 36 feet high with 9-foot boshes; water-power; worked continuously from organization until 1871.

South Carolina Manufacturing Co., Spartanburg, Spartanburg county. Built in 1835; product, bar iron, blooms, and nails; annual capacity, 2,000 net tons. This mill and two blast furnaces belonging to the same establishment have not been in operation for several years.

ALABAMA.

Brierfield Iron Works Co., Brierfield, Bibb county. Bar mill. Standing since 1865.

TENNESSEE.

Memphis Rolling Mill, James Tranter, of Cincinnati, Ohio. Mill at Memphis, Shelby county. Built in 1866; 1 double and 1 single puddling furnace, 2 heating furnaces, and 2 trains of rolls (one 9 and one 16-inch); product, all sizes merchant bar, plow slabs, fish bars, and street rails; annual capacity, 5,000 net tons.

OHIO.

Alliance Rolling Mill, Alliance Rolling Mill Co., Alliance, Stark county. Built in 1867; 2 double puddling furnaces, 11 heating furnaces, and 2 trains of rolls; product, rails; annual capacity, 30,000 net tons; average make, 22,000 tons. Wm. Jones, Secretary.

Leetonia Nail and Bolt Co., Leetonia, Columbiana county. 26 nail machines, and train for making nail plate; no puddling furnaces; annual capacity, 2,600 net tons. H. F. Christy, Agent.

Warren Iron Works, Wm. Richards & Sons, Warren, Trumbull county. Built in 1870; 16 puddling and 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, muck and merchant bar; annual capacity, 9,000 net tons. Burned in 1878.

BESSEMER STEEL WORKS.

A COMPLETE LIST OF ROLLING MILLS IN THE UNITED STATES WHICH MANUFACTURE BESSEMER STEEL RAILS.

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.

Albany and Rensselaer Iron and Steel Co., Troy, New York. Two 6½-ton converters. Made their first blow February 15, 1865.

Bethlehem Iron Co., Bethlehem, Pa. Two 7-ton converters. Made their first blow on Saturday, October 4, 1873, and their first steel rail on Saturday, October 18, 1873.

Pennsylvania Steel Works, Pennsylvania Steel Co., Steel Works P. O., Baldwin Station, near Harrisburg, Pa. Office, 216 South Fourth st., Philadelphia. Two 6½-ton converters. Made their first blow in June, 1867.

Lackawanna Iron Works, Lackawanna Iron and Coal Co., Scranton, Pa. Two 5-ton converters. The foundations were laid June 16, 1874, the first blow was made October 23, 1875, and the first steel rail was rolled December 29, 1875.

Cambria Iron Works, Cambria Iron Co., Johnstown, Pa. Office, 218 South Fourth st., Philadelphia. Two 5-ton converters (soon to be enlarged to 7 tons). Made their first blow July 10, 1871.

Edgar Thomson Steel Works, Edgar Thomson Steel Co. Limited, Bessemer Station, Allegheny county, Pa. Office at Pittsburgh. Two 7-ton converters. Made their first blow August 26, 1875, and their first steel rail September 1, 1875.

Newburgh Rolling Mill, Cleveland Rolling Mill Co., Cleveland, Ohio. Two 6-ton converters. Made their first blow October 15, 1868.

Union Rolling Mill, Union Rolling Mill Co., Chicago, Illinois. Two 6-ton converters. Made their first blow July 26, 1871.

North Chicago Rolling Mill, North Chicago Rolling Mill Co., Chicago, Illinois. Two 6-ton converters. Made their first blow April 10, 1872.

Joliet Iron and Steel Works, Joliet Iron and Steel Co., Joliet, Illinois. Two 6½-ton converters. These works made their first blow January 26, 1873, and their first steel rail March 15, 1873.

Vulcan Iron Works, St. Louis, Mo. Two 7-ton converters. Works begun in 1875; made their first blow September 1, 1876.

Number of Bessemer steel works: 11. Total annual capacity, 750,000 net tons of ingots.

CRUCIBLE CAST STEEL WORKS.

NOTE.—The steel works which are connected with iron rolling mills are fully described in the list of rolling mills, to which list reference is made below after each establishment having such connection.

MASSACHUSETTS.

Washburn Carwheel Co., Worcester. Office, Hartford, Conn. Ten 4-pot furnaces, 1 train of tire rolls, and one 30-ton hammer; product, car-wheel tires. Nathan Washburn, President.

Number of crucible steel works in Massachusetts: 1.

CONNECTICUT.

Collins Company, Collinsville, Hartford county. Established in 1826; 2 single scrapping furnaces on cinder bottom, one Catalan forge, 8 heating furnaces, one 18-inch train of rolls, one 12-inch train, 2 Sellers steam hammers, one 20-ton steel cementing furnace, and 30 steel melting holes; 180 pots in steel works; water and steam power; product, bar iron and cast steel, consumed wholly in these works in the production of edge tools, steel plows, etc.; annual capacity of finished iron, 2,000 net tons, and of steel, 750 net tons. President and Treasurer, E. B. Watkinson; Vice-President, Secretary and Manager, William J. Wood; Agent, Edward H. Sears; Superintendent, Charles H. Blair.

Farist & Windsor, Windsor Locks, Hartford county. Built in 1860; 2 heating furnaces, 2 trains of rolls, 3 hammers, and 10 steel-melting holes; steam and water power; product, cast steel, rolled and hammered; annual capacity, 750 net tons.

Farist Steel Works, Farist Steel Co., Bridgeport, Fairfield county. Built in 1868; 2 single puddling and 4 heating furnaces, 2 trains of rolls (one 12 and one 15-inch), 5 hammers, and 18 steel-melting holes; product, cast steel, rolled and hammered; annual capacity, 1,500 net tons.

Number of crucible steel works in Connecticut: 3.

NEW YORK.

Chrome Steel Works, corner Kent avenue and Keap st., Brooklyn. Built in 1869; 7 heating furnaces, 7 hammers, 24 steel-melting holes, and 2 trains of rolls (one 9 and one 18-inch); product, tool steel; annual capacity, 2,000 net tons. C. P. Haughian, Superintendent; C. D. Schubarth, Treasurer.

Monhagen Steel Works, Wheeler, Madden and Clemson Manufacturing Co., Middletown, Orange county. Built in 1862-3; fourteen 4-pot steel-melting holes, 3 heating furnaces, 1 train of rolls, and 1 hammer; 56 pots in steel works; product, saw cast steel; annual capacity, 500 net tons. E. M. Madden, President; Wm. Clemson, Vice-President; Wm. Millspaugh, Secretary; Charles J. Humphrey, Treasurer.

Sanderson Bros. Steel Co., Syracuse. New York office, 16 Cliff st. Established in 1877; 5 heating furnaces, 4 hammers, 2 trains of rolls (one 9 and one 12-inch), 4 steel cementing furnaces, and 3 steel-melting holes; 51 pots in steel works; use clay pots made by themselves; product, bar cast steel; annual capacity, 2,000 net tons. Brand, "Sanderson Bros. & Co." President, Robert B. Campbell; Secretary, Samuel Wm. Johnson; Treasurer, Edward Frith; General Manager, Wm. A. Sweet.

Number of crucible steel works in New York: 3.

NEW JERSEY.

Adirondac Steel Works, Gregory & Co., Jersey City. Originally built in 1848 and enlarged from 1863 to 1866; 2 forge fires, 7 heating furnaces, 6 hammers, 40 4-pot steel-melting holes, and 3 trains of rolls (one 9, one 12, and one 18-inch); 160 pots in steel works; product, cast steel; annual capacity, 2,500 net tons. Use Swedish and Northern New York charcoal wrought irons for melting. Steel brand, "Adirondac." H. J. Hopper, Manager.

Jersey City Steel Works, James R. Thompson & Co., Jersey City. Commenced operations August 1, 1862; one single and 2 double puddling furnaces, 7 heating furnaces, and 4 trains of rolls (two 9, one 12, and one 16-inch); 5 steam hammers, 2 helve hammers, and 56 steel-melting holes; product, cast steel solely; annual capacity, 4,000 net tons.

Newark Steel Works, Benjamin Atha & Co., Newark, Essex county. Commenced business in 1864; 36 4-pot steel-melting holes, 6 steam hammers, and 4 trains of rolls (one 16, one 12, one 9, and one 8-inch); 144 pots in steel works; product, every kind of cast steel except sheet; total annual capacity, 3,600 net tons. Brand, "Newark."

North River Steel Works, 13th and Henderson sts., Jersey City. Built in 1875; 24 melting holes, 2 trains of rolls (8 and 18-inch), 2 hammers, and 3 heating furnaces; product, cast steel; annual capacity, 1,500 net tons.

Pompton Steel and Iron Co., Pompton, Passaic county. Built in 1863; 5 single puddling furnaces, 6 heating furnaces, 42 steel-melting furnaces, 2 trains of rolls, and 5 hammers; water and steam power; product, crucible cast steel, and railway car springs; annual capacity,

2,000 net tons. James Ludlum, President and Treasurer; Richard Wright, Secretary; Joseph W. McElroy, Superintendent.
Number of crucible steel works in New Jersey: 5.

PENNSYLVANIA.

Beaver Falls Steel Works, Abel & Pedder, Beaver Falls, Beaver county.

Built in 1875; 1 Siemens 24-pot steel furnace, 1 Siemens heating furnace, 3 other heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 16 and one 19-inch); 24 pots in steel works; steam and water power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,200 net tons.

Black Diamond Steel Works, Park, Brother & Co., Pittsburgh. Established in May, 1862; 6 single puddling furnaces, 3 forge fires, 51 heating and annealing furnaces, 7 trains of rolls (one 8, one 9, one 10, one 12, one 16, one 18, and one 26-inch), 21 hammers, 7 steel-cementing furnaces, 3 42-pot Siemens furnaces, 2 24-pot Siemens furnaces, 1 30-pot Siemens furnace, and 24 2-pot steel melting holes; 252 pots in steel works; 1 Siemens rotator furnace for making iron direct from the ore; product, all varieties of crucible cast steel; annual capacity, 15,000 net tons. Brands, "Black Diamond" and "Corona." General Manager, James Park, Jr.; Business Managers, Charles L. Caldwell and William G. Park; Superintendents, John Hancock and Alexander W. Black.

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. Built in 1867; 10 heating furnaces, 6 trains of rolls, 3 steel-cementing furnaces, 24 steel-melting holes, four 24-pot Siemens melting furnaces, and 8 hammers; also, one forge for making iron direct from the ore for their own use; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 4,000 net tons. Brand, "Crescent."

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot melting furnaces, and 3 steam hammers; product, machinery steel, frog plates and points, cast spring steel, and all kinds of steel forgings; annual capacity, 750 net tons.

Fort Pitt Iron and Steel Works, John Graff, Pittsburgh. Product, cast steel. *See Rolling Mills.*

Hussey, Binns & Co., Pittsburgh. Steel plant built in 1875; one 24-pot Siemens furnace, 3 sets of rolls, 14 heating furnaces, 1 steam hammer, 1 helve hammer, 4 drops, 3 presses, 4 punches, and numerous machines used in shovel-making; product, cast steel, used by the firm in making shovels.

Hussey, Howe & Co., Pittsburgh. Built in 1859; 16 single puddling furnaces, 26 heating furnaces, 11 hammers, 96 2-pot coke steel furnaces, 6 24-pot Siemens furnaces, and 9 trains of rolls (one 9, one 12, four 16, two 18, and one 28-inch); 336 pots in steel works; product, crucible cast steel, in bars, sheets, rods, plates, and forgings of all kinds; annual capacity, 13,000 net tons ingots. Building one 7-ton Siemens open-hearth furnace.

Keystone Saw, Tool, Steel and File Works, Henry Disston & Sons, Front and Laurel sts., Philadelphia. Branch works at Tacony, Philadelphia. Founded in 1840, and commenced the manufacture of steel in 1854; now running 42 melting furnaces, 2 trains of rolls, 6 heating furnaces, and 1 hammer; product, principally saw steel of every description; also tool steel, homogeneous steel, steel for engravers' plates, etc.; annual capacity, 2,500 net tons. Brand, "Disston."

La Belle Steel Works, Smith, Sutton & Co., Pittsburgh. Built in 1863; 2 25-ton and 2 30-ton converting furnaces, 2 double puddling furnaces, 10 forge fires, 11 heating furnaces, 24 2-pot steel-melting holes, 7 hammers, and 3 trains of rolls, (one 20, one 16, and one 10-inch); 48 pots in steel works; product, merchant steels of every description; also, springs and iron and steel axles; annual capacity, 7,000 net tons.

Midvale Steel Works, Nicetown P. O., Philadelphia. Built in 1866; one 4-ton air furnace for melting pig, and 11 coal and 3 gas-heating furnaces; one gas pot muffle and one kiln for drying; moulding and annealing shop, with 2 annealing and 4 drying furnaces; 5 steam hammers, from 8 tons to 300 lbs.; tire-rolling mill, with capacity for 30 tires a day; machine shop, with five 80-inch boring and turning mills, two 80-inch and four 24-inch lathes, and one planer, 36 inches by 10 feet; one 30-ton converting furnace, with a yearly capacity of 500 net tons, fifty 4-pot steel-melting holes, one 30-pot Siemens gas melting furnace, one 6-ton Siemens open-hearth furnace, and one 4-ton Sellers open-hearth melting furnace; product, axles, tires, and tool, machinery, spring and frog steel, and all kinds of castings and forgings; daily capacity, 40 net tons, and yearly capacity, 12,000 net tons of cast steel. William Sellers, President; Marriott C. Smyth, Treasurer and Secretary; C. A. Brinley, Superintendent.

Nellis's Agricultural Works, A. J. Nellis, Pittsburgh. Built in 1870; 6 forge fires, 9 heating furnaces, 4 hammers, and five 4-pot steel-melting holes; 20 pots in steel works; product, all kinds of steel and iron for agricultural purposes, plow work, etc. Supt., Seymour Rogers.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Product, cast steel and agricultural steel. *See Rolling Mills.*

Philadelphia Steel Works, Assignees of William Baldwin, Frankford P. O., Philadelphia. Built in 1865; 4 heating furnaces, 6 steam drop hammers and one tilt hammer, one cementing furnace, not now in use, and 32 steel-melting holes; product, cast and shear steel, frog steel, railroad and locomotive forgings, sledges, hammers, tools, etc.; annual capacity, 1,200 net tons.

Pittsburgh Steel Casting Co., Pittsburgh. Built in 1871; two 24-pot Siemens furnaces and 7 annealing furnaces; 48 pots in steel works; product, cast steel castings; annual capacity, 2,000 net tons. James Irwin, President; Alfred Patterson, Vice-President; Henry W. Patterson, Sec., Treas., and General Manager; Wm. Hainsworth, Supt.

Pittsburgh Steel Works, Anderson & Passavant, Pittsburgh. Built in 1845; 5 24-pot Siemens furnaces, 3 sets of coke-hole furnaces, 6 converting furnaces (weekly capacity, 90 net tons), 3 single puddling furnaces, 8 forge fires, 25 heating furnaces, 16 hammers, rake-tooth shop, and 10 trains of rolls (two 20-inch plate, one 16-inch bar, one "universal" train, one 16-inch spring, two 16-inch sheet, and one 8, one 9, and one 10-inch guide); a new wire rod mill erected in 1877, on an improved plan, with capacity to turn out 20 tons per ten hours of No. 5 crucible cast steel; there are 150 pots in the steel works, which are run double turn, 3 heats each turn, making them equal to 900 single pots daily; product, cast and German plow steel, plate steel, and best edge-tool steel; annual capacity, 10,000 net tons. These works are furnishing all the steel for the East River Bridge—4,200 tons. Building one 10-ton Siemens open-hearth furnace.

Pitt Steel Works, Isaac Jones, (President Real Estate Savings Bank,) Pittsburgh. Works at McKeesport, Allegheny county. Established in 1875; one 24-pot Siemens furnace, 4 heating furnaces, 2 knobbling charcoal bloom furnaces, and 4 Bement hammers, of 700, 1,000, 1,200, and 2,500 lbs. weight of heads respectively; product, tool steel of all kinds; annual capacity, 1,400 net tons. Idle and for sale.

Singer, Nimick & Co., Pittsburgh. Built in 1848. In mill, 6 puddling and 6 knobbling furnaces, one 18-inch train of rolls, and one 4½-ton steam hammer, four 24-pot Siemens gas furnaces, 30 melting furnaces, and one 7-ton Siemens open-hearth furnace; annual capacity, 12,000 net tons of cast steel. In steel-converting department, 8 furnaces; annual capacity, 5,500 net tons. In finishing mill, one 22-inch, 3-high sheet and plate train, one 16-inch and one 10-inch bar train, 11 heating furnaces, and 10 hammers; the new plate mill has 4 sets of 28-inch rolls, 4 sets of 20-inch rolls, and 6 heating furnaces. Product, steel plates, tool steel, saw steel, and all other kinds of steel, carriage springs, and axles.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Product, cast steel. *See Rolling Mills.*

Number of crucible steel works in Pennsylvania : 18.

MARYLAND.

Cumberland Steel Works, William Hall, Cumberland, Alleghany county.

Built in 1873-4 ; 5 heating furnaces, 1 Siemens pot melting furnace, 1 blistering furnace, and 4 steam hammers ; product, all sizes of hammered tool and machinery steel ; annual capacity, 800 net tons.

Number of crucible steel works in Maryland : 1.

OHIO.

American Cast Steel Co., Detroit st., Cleveland. Built in 1878 ; product, bar and other steel, under the Bechtold patent.

Burgess Steel and Iron Works, Portsmouth, Scioto county. Product, cast steel. *See Rolling Mills.*

Canton Steel Works, Bolton, Myers & Co., Canton, Stark county. Built in 1872 ; new firm organized in 1874 ; 7 heating furnaces, one 12-inch and one 20-inch train of rolls, 3 hammers, 12 coke steel-melting holes, and one Siemens open-hearth furnace ; product, machine, spring, tire, and tool cast steel ; specialties, spring steel, patent spindle-finished machine steel, and fine tool steel.

Cleveland Cast Steel Works, H. W. Foote, 145 Superior st., Cleveland. Built in 1877 ; product, steel castings and cast steel of all descriptions.

Wheeling Steel Works, Martin's Ferry, Belmont county. Built in 1873-4 ; 2 heating furnaces, 12 steel-melting holes, and 2 hammers ; product, all sizes of tool cast steel.

Number of crucible steel works in Ohio : 5.

KENTUCKY.

Swift's Iron and Steel Works, Cincinnati. Works at Newport, Ky. Product, cast steel. *See Rolling Mills.*

Number of crucible steel works in Kentucky : 1.

TENNESSEE.

Providence Steel Works, John Leighton, P. O. Box 176, Chattanooga. Removed from Kingston, Tenn., in 1877 ; 1 puddling furnace, three 2-pot steel furnaces, and 2 hammers ; product, cast steel.

Number of crucible steel works in Tennessee : 1.

Total number of crucible steel works in the United States : 38.

OPEN-HEARTH STEEL WORKS.

NOTE.—The italic references herein made indicate in what part of this book a full description of the works may be found. The ton here used is the ton of 2,240 pounds.

- Bay State Iron Co., Boston, Mass. One 6-ton Siemens open-hearth furnace. *See Rolling Mills.*
- Blair Iron and Steel Co., Pittsburgh, Pa. Works at Glenwood, on Monongahela river and Connellsville railroad, 5 miles from Pittsburgh. Iron sponge is made from ore by Thomas S. Blair's direct process, and steel ingots are made with sponge in one 6-ton Siemens open-hearth furnace. Product of works is in steel ingots; capacity, 60 net tons per week. There are 5 Blair sponge furnaces, 1 Siemens furnace, 2 heating furnaces, hydraulic machinery, etc.
- Burgess Steel and Iron Works, Portsmouth, Ohio. Building one 7-ton Siemens open-hearth furnace. *See Rolling Mills.*
- Cambria Iron Co., Johnstown, Pa. Building two 10-ton Siemens open-hearth furnaces, with Pernot's modification. *See Rolling Mills.*
- Canton Steel Works, Bolton, Myers & Co., Canton, O. One 6-ton Siemens open-hearth furnace. *See Crucible Cast Steel Works.*
- Cleveland Rolling Mill Co., Cleveland, O. Three 7-ton Siemens open-hearth furnaces. *See Rolling Mills.*
- Hussey, Howe & Co., Pittsburgh, Pa. Building one 7-ton Siemens open-hearth furnace. *See Crucible Cast Steel Works.*
- Midvale Steel Works, Nicetown, Philadelphia. One 6-ton Siemens and one 4-ton Sellers open-hearth furnace. *See Crucible Cast Steel Works.*
- Nashua Iron and Steel Co., Nashua, N. H. One 10-ton Siemens open-hearth furnace. *See Rolling Mills.*
- New Jersey Steel and Iron Co., Trenton, N. J. One 6-ton Martin open-hearth furnace. *See Rolling Mills.*
- Norway Iron Works, Naylor & Co., Boston, Mass. Three 7-ton Siemens open-hearth furnaces. *See Rolling Mills.*
- Otis Iron and Steel Works, Otis Iron and Steel Co., Cleveland, Ohio. Built in 1872-3; put in operation Jan. 1, 1875; 3 Siemens heating furnaces, 2 hammers, two 7-ton Siemens open-hearth furnaces, and 3 trains of rolls (one 10, one 20, and one 32-inch); product, steel plate, bar steel, and forgings; annual capacity, 4,000 net tons. Charles A. Otis, President and Treasurer; J. K. Bole, Secretary.
- Pennsylvania Steel Co., 208 South Fourth st., Philadelphia. Two 7-ton Siemens open-hearth furnaces. *See Rolling Mills.*

Pittsburgh Steel Works, Anderson & Passavant, Pittsburgh, Pa. Building one 10-ton Siemens open-hearth furnace. *See Crucible Cast Steel Works.*

Roane Iron Co., Chattanooga, Tenn. Two 10-ton Siemens open-hearth furnaces. Another 10-ton open-hearth furnace is contemplated. *See Rolling Mills.*

Rumford Chemical Works, G. F. Wilson & Co., Providence, R. I. One 6-ton Siemens open-hearth furnace.

Singer, Nimick & Co., Pittsburgh, Pa. One 7-ton Siemens open-hearth furnace. *See Crucible Cast Steel Works.*

Springfield Iron Co., Springfield, Ill. Building two 10-ton Siemens open-hearth furnaces. *See Rolling Mills.*

St. Albans Iron and Steel Co., St. Albans, Vermont. One 10-ton Siemens open-hearth furnace. *See Rolling Mills.*

Total number of open-hearth steel works: 14 completed works and 5 building. The annual capacity of the 22 open-hearth furnaces in the 14 completed works is about 100,000 net tons of ingots. The 8 additional open-hearth furnaces now being erected or projected will increase this capacity to 150,000 net tons of ingots.

MISCELLANEOUS STEEL WORKS.

NOTE.—These works do not convert Bessemer, open-hearth, or crucible cast steel, but *only* make puddled, blister, German, or McHaffey steel.

Alikanna Rolling Mill, Flaccus & Daker Bros., Steubenville, Ohio. Product, puddled steel. *See Rolling Mills.*

Chester Steel Castings Co., Chester, Pa. Built in 1871; one cupola, and 5 annealing furnaces; product, steel castings by the McHaffey process; annual capacity, 300 net tons.

Codorus Steel Works, York County Iron and Steel Co., York, Pa. Product, puddled steel. *See Rolling Mills.*

Duquesne Steel Works, J. S. Liggett, Spruce and Market sts., Pittsburgh, Pa. Built in 1865; 1 30-ton converting furnace, 5 heating furnaces, 1 train of rolls, and 2 hammers; product, German steel used in spring works attached.

Elmira Iron and Steel Rolling Mill Co., Elmira, New York. Product, silicon steel for rail tops. *See Rolling Mills.*

- Eureka Cast Steel Co., Chester, Pa. Built in 1877, to make steel castings by the McHaffey process improved.
- Ironton Rolling Mill, Iron and Steel Co., Ironton, Ohio. Product, puddled steel. *See Rolling Mills.*
- Onondaga Steel Works, Sweet's Manufacturing Co., Syracuse, N. Y. Product, blister steel. *See Steel Manipulating Works.*
- Total number of miscellaneous steel converting works: 8.

STEEL MANIPULATING WORKS.

NOTE.—These works manipulate crucible cast steel and steel scrap, or roll Bessemer steel blooms, Bessemer steel rail ends, old Bessemer steel rails, or Siemens-Martin steel ingots.

- Boston Rolling Mills, 17 Batterymarch st., Boston, Mass. Roll steel scrap. *See Rolling Mills.*
- Bridgewater Iron Co., Bridgewater, Mass. Product, steel from steel scrap. *See Rolling Mills.*
- Catasauqua Manufacturing Co., Catasauqua, Pa. Product, steel boiler and shovel plate, puddled from scrap steel. *See Rolling Mills.*
- Chicago Steel Works, 806 Noble st., Chicago, Illinois. Built in 1873; 4 heating furnaces and 2 trains of rolls; manipulate Bessemer steel rail ends; product, tires, plow-beams, crow-bars, springs, toe-calk steel, and squares and rounds; annual capacity, 1,800 net tons. C. P. Buckingham, President, and E. H. Buckingham, Superintendent.
- Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Ohio. Steel mixed carriage tire. *See Rolling Mills.*
- Eureka Steel and Iron Works, Black, Daker & Co., Wellsville, Ohio. Plow and shovel steel and steel plate. *See Rolling Mills.*
- Gautier Steel Co. Limited, Johnstown, Pennsylvania. Built in 1878; 12 heating furnaces, 2 hammers, and 8 trains of rolls (two 9, four 12, and two 20-inch); product, steel wire, springs, rake teeth, finger bars, etc.; special attention given to the manufacture of all steels used on agricultural machines; annual capacity, 30,000 net tons. Chairman, D. G. Gautier, 93 John st., New York; Secretary and Treasurer, D. J. Morrell; Supt., Charles Douglass. These works are an outgrowth of D. G. Gautier & Co., Jersey City, transplanted and enlarged.
- Globe Rolling Mill, Globe Rolling Mill Co., Cincinnati. Product, steel from steel scrap. *See Rolling Mills.*

- Iron and Steel Works, Derby, Conn. Product, steel from steel scrap. *See Rolling Mills.*
- Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Product, steel from steel scrap. *See Rolling Mills.*
- Lake Erie Iron Co., Cleveland, Ohio. Steel axles. *See Rolling Mills.*
- Louisville Rolling Mill Co., Louisville, Ky. Steel from steel scrap. *See Rolling Mills.*
- Nes Silicon Steel Works, Sandusky, Ohio. Silicon steel rail tops. *See Rolling Mills.*
- Ohio Valley Steel and Iron Works, Mitchell, Tranter & Co., Cincinnati. Works at Covington, Ky. Product, steel from steel scrap. *See Rolling Mills.*
- Onondaga Steel Works, Sweet's Manufacturing Co., Syracuse, N. Y. Built in 1864; 11 heating furnaces, 3 hammers, 4 trains of rolls (one 9, one 10, and two 12-inch), and 4 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, 4,800 net tons. Wm. A. Sweet, President and Manager; Fred. B. Chapman, Secretary; J. M. Schermerhorn, Jr., Treasurer.
- Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Co., W. E. C. Coxe, Supt., Reading, Pa. Makes cast steel rails from purchased ingots. *See Rolling Mills.*
- Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Pennsylvania. Built in 1869; 28 4-pot melting holes, not now used, 5 heating furnaces, 2 hammers, 1 tire mill, and 4 boring mills; product, steel locomotive and car tires, axles, and forgings. Specialty, locomotive and car-wheel tires. Ingots are obtained from the Otis Iron and Steel Co., and are worked here. Brand, the word "Standard," between two anchors. Wm. Burnham, Secretary and Treasurer, and Wm. G. Neilson, General Manager.
- St. Louis Bolt and Iron Co., St. Louis, Mo. Works in St. Clair county, Illinois. Product, light steel rails and steel tire, from old Bessemer steel rails. *See Rolling Mills.*
- Superior Rolling Mill, Andrew Kloman, Pittsburgh. Steel for structural purposes. *See Rolling Mills.*
- Syracuse Iron Works, Syracuse, N. Y. Roll steel scrap. *See Rolling Mills.*
- Tennessee Iron and Steel Co., Chattanooga, Tennessee. Roll purchased cast steel. *See Rolling Mills.*

Washburn and Moen Manufacturing Co., Worcester, Mass. Draw wire from crucible cast steel. *See Rolling Mills.*

Youngstown Rolling Mill Co., Youngstown, Ohio. Compound steel buggy tire. *See Rolling Mills.*

Total number of works in the United States which manipulate steel: 23.

RECENTLY ABANDONED STEEL WORKS.

Atlantic Steel Works, Richardson, Boynton & Co., 232 Water st., New York. Abandoned the manufacture of steel in 1875.

Crucible Cast Steel Casting Co. Limited, Pittsburgh. Built in 1875; 3 steel-cementing furnaces and 8 steel-melting holes; product, cast steel castings; annual capacity, 600 net tons. J. F. Denniston, Secretary and Treasurer.

Chicago Sheffield-Steel Works, 149 Fulton st., Chicago. Built in 1874-5; 2 heating furnaces, 2 hammers, and 4 steel-melting holes; product, tool and machinery steel; annual capacity, 300 net tons. Chas. H. Cram, President; George S. Smith, Secretary; John P. Farrar, Superintendent.

CATALAN FORGES.

[Under this title are embraced all works which make blooms or billets direct from ore.]

VERMONT.

Fairhaven Iron Works, Fairhaven, Rutland county. Built in 1796; 2 fires and 1 hammer; water-power; product, blooms.

White River Iron Works, Lingg, Bro. & Co., Bethel, Windsor county. Built in 1878; 4 forge fires (with a capacity of 8) and 1 steam hammer; product, charcoal blooms for steel, made by the improved Wilson direct process from the pure magnetic iron sand obtained from alluvial deposits along White river. J. J. Saltery, Manager.

Williams, A., East Middlebury, Addison county. One forge; 3 fires; product, charcoal blooms.

Number of Catalan forges in Vermont: 3.

NEW YORK.

LAKE CHAMPLAIN DISTRICT.

- Altona Bloom Iron Works, G. W. & F. Palmer, Altona, Clinton county. Built in 1868; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and sheet, made from Arnold Hill and Port Henry ores; brand, "Altona;" annual capacity, 2,000 net tons.
- Chateaugay Lake Iron Works, Chateaugay Iron Co., Chateaugay Lake P. O., Franklin county. Built in 1875; 10 forge fires and 2 hammers; water-power; product, charcoal blooms for general purposes, made from ore. Andrew Williams, President; John H. Moffitt, Superintendent.
- Horicon Iron Co., 24 Cliff st., New York. Works at Ticonderoga, Essex county. Built in 1864; 6 fires and 2 hammers; water-power; product, charcoal blooms for general purposes, made from ore. Cyrus Butler, President; F. W. Potter, Secretary and Treasurer; Wm. Hooper, Superintendent. *See Paradox Iron Works.*
- Irondale Iron Works, Andrew Williams, Redford, Clinton county. Four forge fires and 1 hammer; water-power; product, charcoal blooms for steel, made from ore.
- Ironville Iron Works, Crown Point Iron Co., Ironville, Essex county. Built in 1828; 6 forge fires and 2 hammers; water-power; product, charcoal blooms for general purposes, made from ore; annual capacity, 2,400 net tons. *See Anthracite Furnaces.*
- Kingdom Forge, Essex and Lake Champlain Ore and Iron Co., Elizabethtown, Essex county. Built in 1825; 6 forge fires and 1 hammer; water-power; product, charcoal blooms from ore. Idle since 1870.
- Lake Champlain Forge, State of New York, owner, State Prison Yard, Dannemora, Clinton county. Built in 1865; 9 fires and 1 hammer; product, charcoal blooms for nail plate, made from ore and scrap. *See Rolling Mills.*
- Lewis Iron Works, William H. Stower, Essex, Essex county. Works at Lewis, Essex county. One forge, built in 1837; 4 forge fires and 1 hammer; steam and water power; product, charcoal blooms for plate and sheet iron, wire, and steel, from ore alone.
- New Russia Iron Works, H. A. Putnam, Elizabethtown, Essex county. Forge at New Russia, 4 miles south of Elizabethtown. One hammer and 4 fires; steam and water power; product, charcoal blooms for wire and steel, made from ore.
- Norton, C. F., Plattsburgh, Clinton county. One forge; 6 fires; product, charcoal blooms for steel and other purposes, made from ore. *See Charcoal Furnaces. See Rolling Mills. See Bloomaries.*

- Paradox Iron Works, Horicon Iron Co., 24 Cliff st., New York. Works at Schroon River, Essex county. Built in 1864; 3 fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from ore; annual capacity, 900 net tons. *See Horicon Iron Company.*
- Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; intended for 3 fires, but 2 only are in operation; 1 hammer; water-power; product, charcoal blooms for best boiler plate, made from ore; annual capacity, 1,000 net tons.
- Peru Steel and Iron Co., 91 Reade st., New York. Works at Clintonville, Clinton county. Built in 1837; 20 forge fires and 5 hammers; water-power; product, charcoal blooms for steel, made from ore; annual capacity, 5,000 net tons. *See Rolling Mills.*
- Reynolds, J. F., Irona, Clinton county. Built in 1868; 4 forge fires and 1 hammer; product, charcoal blooms for boiler plate and sheet iron, made from ore.
- Riverside Iron Works, Belden Noble, Washington, D. C. Works at Ironville, Essex county. Built in 1835 and rebuilt in 1863; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and wire, made from ore.
- Rogers (J. & J.) Iron Co., 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. All run by water-power. Product, charcoal blooms for best tool cast steel, made from ore. Total annual capacity, 8,000 net tons. *See Rolling Mills.*
- Russia Iron Works, Williams & Moffitt, Moffittsville, Clinton county. Built in 1844; 5 forge fires and 1 hammer; water-power; product, blooms for steel and boiler plate, made from Chateaugay ore; brand, "W. M." Make half blooms for open-hearth steel.
- Schroon River Iron Works, John Roth, Schroon River, Essex county. Built in 1857; 4 fires; water-power; product, blooms from ore.
- Stackpole, S., Dannemora, Clinton county. Built in 1874; 2 forge fires; product, charcoal blooms from ore.
- Star Iron Works, Bowen & Signor, Saranac, Clinton county. Two forges, built in 1844; each has 6 forge fires and 1 hammer, and is operated by water-power. Product of one forge is steel billets, wire billets, and blooms for boiler plate and flue iron, all made from ore; annual capacity, 2,000 net tons. Product of the other forge is blooms made by the Peckham process, equal to the best Norway or Swedish iron for bolts, rivets, and horse nails; annual capacity, 2,300 net tons. *See Rolling Mills.*

Stone Forge, Nichols, Hull & Co., Plattsburgh, Clinton county. Built in 1840; 4 forge fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from ore.

Williams, A., Clayburgh, Clinton county. Built in 1844; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for wire and steel, made from ore.

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; 4 forge fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and steel, made from Keene ore; brand, two W's in circles.

Wood Brothers, Wood's Falls, Clinton county. Built in 1863, and rebuilt in 1872; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for all purposes as demanded, made from ore and occasionally scrap iron.

Number of Catalan forges in New York: 24.

ABANDONED.

John Merchant's Forge, Schuyler Falls, Clinton county. One forge, built in 1844; 2 fires; 1 hammer; water-power; product, blooms.

NEW JERSEY.

Norway Iron Co., Rockaway, Morris county. Occupy the old Rockaway mill, built in 1826; 4 forge fires and 1 steam hammer; have a stamp mill; use Lake Champlain ores; product, charcoal blooms by the Wilson process, from ore. Israel D. Condit, President, Milburn, N. J.; Joel Wilson, Superintendent.

Number of Catalan forges in New Jersey: 1.

VIRGINIA.

Bales's Forge, Bales & Co., Lee county, near Jonesville. Two forge fires and 1 hammer; water-power; product, bar iron for local use, made from ore.

Mockasine Forge, James P. White, Estillville, Scott county. Built in 1851; 1 forge fire and 1 hammer; water-power; product, bar iron for neighborhood use, made from ore and scrap iron.

Penington's Forge, Wm. Penington, Jonesville, Lee county. Built in 1873; 1 forge fire and 1 hammer; water-power; product, bar iron for neighborhood use, made from ore and scrap iron.

Reed Island Forge, Forney & Co., Allisonia, Pulaski county. Built in 1875; water-power; 2 fires, but are prepared to increase the number to 5 or 6 as soon as trade improves; product, bar iron from brown hematite ore. D. S. Forney, Manager.

Number of Catalan forges in Virginia: 4.

NORTH CAROLINA.

Catawba Valley Iron Works, Powells, Little & Co., Catawba, Catawba county. Built in 1874; 2 forge fires and 1 hammer; steam and water power; fuel, charcoal; product, bar iron, plow molds, etc., made from ore.

Cranberry Forge, Mitchell county. Product, bar iron for local use, made from ore.

Henson's Forge, Selena Henson, Murphy, Cherokee county. Built in 1853; 2 forge fires and 1 hammer; water-power; fuel, charcoal; product, bar iron for local use, made from ore. Wm. Beal, Agent.

Livingood's Forge, Dr. J. W. Patton, Murphy. Product, bar iron for local use, made from ore.

Madison Forge, Jonas W. Derr, Lincolnton, Lincoln county. Two forge fires, 1 refinery fire, and 2 hammers; water-power; fuel, charcoal; product, bar iron for local use, made from ore and scrap iron. *See Furnaces.*

Maiden Creek Forge, William Williams, Newton, Catawba county. Built about 1825; 2 forge fires and 1 hammer; fuel, charcoal; product, bar iron for local use, made from ore.

Owl Creek Forge, Meser Fain, Murphy, Cherokee county. Built in 1852. Product, bar iron for local use, made from ore.

Tomotla Forge, Tomotla, Cherokee county. Built in 1869. Product, bar iron for local use, made from ore. Joseph Kinsey, President, Cincinnati, O. A. A. Campbell, Superintendent, Ducktown, Polk county, Tennessee. Idle for several years.

Number of Catalan forges in North Carolina: 8.

TENNESSEE.

Hampton Forge, Hampton, Carter county. Two fires. Product, bar iron for local use, made from ore.

Speedwell Forge, Speedwell, Claiborne county. Product, bar iron for local use, made from ore.

Taylor Iron Works, Elizabethtown, Carter county. Three fires. Product, bar iron for local use, made from ore.

It is estimated that in the mountainous districts of East Tennessee there are 20 additional Catalan forges, which are usually operated by farmers who only make bar iron from ore whenever it is needed in their immediate neighborhood. The manufacture is not generally carried on by them as a business, and their forges seldom have names; hence it is difficult to make a list of them.

Number of Catalan forges in Tennessee: 23.

MISSOURI.

Peckham Iron Co., Kimmswick, Jefferson county. Built in 1873; 5 knobbling fires and 1 hammer; product, charcoal blooms; annual capacity, 1,200 net tons. Remodeled in 1877 to make iron by Peckham's patent direct process. E. Peckham, President; S. B. Kellogg, Secretary and Treasurer.

Number of Catalan forges in Missouri: 1.

Total number of Catalan forges in the United States: 64. In addition to these works, there are several iron and steel manufacturers who either make a small quantity of wrought iron from ore or are experimenting in that direction. These are the Collins Company, at Collinsville, Conn., and Miller, Metcalf & Parkin, Park, Bro. & Co., and Phillips, Nimick & Co., at Pittsburgh.

BLOOMARIES.

[Under this title are embraced all works which hammer blooms from pig or scrap iron.]

MASSACHUSETTS.

East Bridgewater Forge, Mount Hope Iron Co., East Bridgewater, Plymouth county. Office at Somerset, Bristol county. Built in 1830; 2 forge fires and 1 hammer; water-power; product, charcoal blooms for thin plate iron, made from scrap iron. *See Rolling Mills.*

Number of bloomaries in Massachusetts: 1.

NEW YORK.

Jefferson Iron Co., Antwerp, Jefferson county. One forge: 4 fires. *See Charcoal Furnaces.*

Plattsburgh Iron Works, C. F. Norton, Plattsburgh. Built in 1878; 8 forge fires; product, charcoal blooms from pig iron. *See Furnaces. See Rolling Mills. See Catalan Forges.*

Number of bloomaries in New York: 2.

NEW JERSEY.

Bloomington Forge, Martin J. Ryerson, Bloomington, Morris county. Built in 1800 and rebuilt in 1841; 2 forge fires and 1 hammer; water-power; product, charcoal blooms for wire, made from scrap iron.

Powerville Forge, John Leonard, Boonton. Works at Powerville. Of-

fice, 450 West st., New York. 3 forge fires and 1 hammer; water-power; product, charcoal blooms for wire, made from scrap iron. *See Rolling Mills.*

Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built about 1800; 3 forge fires and 1 hammer; water-power; product, charcoal blooms for wire, made from scrap iron.

Split Rock Iron Works, Isaac Hance, lessee, Dover, Morris county. Built in 1797 and rebuilt in 1837; 4 forge fires and 1 hammer; water-power; product, charcoal blooms for sheet iron and wire, made from scrap iron and ore.

Warren Forge, McClees & Co., Phillipsburg, Warren county. Built in 1875; 1 4-tuyere run-out, 3 forge fires, and 1 steam hammer; product, charcoal blooms for sheet iron, made from pig iron; annual capacity, 1,000 net tons. Office, 52 Cliff st., New York. *See Rolling Mills.*

Number of bloomaries in New Jersey: 5.

PENNSYLVANIA.

Barree Forge, Lowry, Eichelberger & Sons, Barree Forge, Huntingdon county. Built in 1785; 4 forge fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 900 net tons. *See Charcoal Furnaces.*

Carlisle Iron Works, C. W. Abl & Son, Carlisle. Works at Boiling Springs, Cumberland county. Built in 1776, and rebuilt in 1860; 5 forge fires and 1 hammer; water power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,400 net tons. *See Charcoal Furnaces.*

Castle Fin Forge, James K. Brown, Castle Fin, York county. Built in 1835; 4 forge fires, 1 run-out fire, and 2 hammers; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 1,000 net tons. Idle since 1874.

Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Built before 1770; 5 forge fires, 1 heating furnace, 1 refinery, and 2 hammers; water-power; product, charcoal blooms for boiler plate and sheet iron, made from pig iron; annual capacity, 1,000 net tons.

Colemanville Works, Edmund Smith, Colemanville, Lancaster county. Built in 1828; 4 forge fires and 1 hammer; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 500 net tons.

Coleraine Forge, Shorb, Stewart & Co., Coleraine, Huntingdon county. Founded in 1805; 7 forge fires. Idle since December, 1874.

Cove Forge, John Royer, Royer P. O., Blair county. Works at Williamsburg. Built in 1811; 1 charcoal forge fire, 2 coke run-out fires, and 1

hammer; water-power; product, blooms for general purposes, made from charcoal pig iron; annual capacity, 450 net tons. *See Charcoal Furnaces.*

Cove Forge, Wm. McIlvain & Sons, Duncannon, Perry county. Office, Reading, Pa. Built in 1864; 5 forge fires, 1 refinery, and 1 hammer; blast operated by water-power, and hammer by steam; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,200 net tons. Augustus Barnitz, Superintendent. *See Eastern Pennsylvania Rolling Mills.*

Eagle Forge, Curtins & Co., Roland, Centre county. Built in 1809; 8 forge fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,500 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Ellendale Forge, Killinger, Kaufman & Co., Ellendale Forge, Dauphin county. Rebuilt in 1872; 5 charcoal forge fires, 1 coke run-out, and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,200 net tons.

Ellwood Forge, J. B. Seidel, Ellwood, Schuylkill county. Built in 1863; 4 forge fires and 1 run-out; water power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,250 net tons.

Exeter Forge, Morgan J. Althouse, Jacksonwald, Berks county. Built in 1836; 3 forge fires and 1 hammer; water-power; charcoal blooms for steel, made from pig iron and steel scrap.

Franklin Forge, James Gardner, Hollidaysburg, Blair county. Four forge fires; water-power; product, charcoal blooms; annual capacity, 900 net tons.

French Creek Forge, Esther Kaufman, St. Peters P. O., Chester county. Built in 1872; 4 forge fires and 1 hammer; water-power; product, coke and charcoal blooms for general purposes, made from scrap and pig iron. Thomas Wanner, Attorney.

Juniata Forge, J. R. Hunter & Co., Petersburg, Huntingdon county. Four forge fires and 1 hammer; water-power; product, charcoal blooms; annual capacity, 800 net tons. Idle for several years.

Juniata Iron Works, Samuel Hatfield, Alexandria, Huntingdon county. Built in 1837; 4 forge fires and one 4-tuyere run-out, and a puddling forge, with 3 single puddling furnaces; water-power; product, charcoal blooms, made into boiler plate at the Brandywine Rolling Mills, Coatesville, Pa.; annual capacity, 950 net tons of blooms, and 750 net tons of puddled blooms. These works have been idle since 1876, owing to the abandonment of the Pennsylvania canal between Huntingdon and Hollidaysburg, on which they depended for transportation. *See Eastern Pennsylvania Rolling Mills.*

- Laurel Forge, South Mountain Mining and Iron Co., Pine Grove Furnace, Cumberland county. Built in 1830; 6 forge fires and 1 hammer; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,500 net tons. *See Charcoal Furnaces.*
- Liberty Forge, Mumma & Boyer, Lisburn, Cumberland county. Built in 1836; 3 forge fires and 1 hammer; water-power; product, charcoal and coke blooms for general purposes, made from pig iron.
- Logan Forge, Valentines & Co., Bellefonte, Centre county. Built in 1810; 12 forge fires, one 6-tuyere run-out, and one 4-ton hammer; product, charcoal blooms for general purposes, made from pig iron. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Mainville Forge, C. E. Pennock & Co., Mainville, Columbia county. Built in 1824; 3 forge fires, 2 hammers, and 1 run-out; water-power; product, charcoal blooms for boiler plate, made from pig iron and old car-wheels; annual capacity, 800 net tons. F. E. Bentz, Superintendent. *See Eastern Pennsylvania Rolling Mills.*
- Maria Forge, G. W. Smith, Sarah, Blair county. Four forge fires and 1 hammer; water-power; product, charcoal blooms; annual capacity, 900 net tons. *See Charcoal Furnaces.*
- Martic Forge, Davies & Potts, Colemanville, Lancaster county. Built in 1755; 4 forge fires and 2 hammers; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 800 net tons.
- Mary Ann Forge, Downingtown, Chester county. Built in 1785; 3 fires and 1 hammer; water-power; product, blooms; annual capacity, 720 net tons.
- Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 forge fires and 1 hammer; water-power; product, charcoal blooms for best wire, made from pig iron. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Mont Alto Iron Works, Mont Alto Iron Co., G. B. Wiestling, Superintendent, Mont Alto, Franklin county. Built in 1866; 7 forge fires and a double run-out fire; Nasmyth steam hammer; product, flat charcoal blooms for best boiler plate, made from pig iron; annual capacity, 2,000 net tons. Brand, "Mont Alto." I. S. Waterman, President, 407 Library st., Philadelphia. *See Charcoal Furnaces.*
- Mount Airy Forge, Thomas E. Williams, Shartlesville, Berks county. Built about 1840; 2 forge fires, one 4-tuyere run-out, and 1 hammer; water-power; product, coke and charcoal blooms for boiler plate and wire, made from pig and scrap iron.
- Mount Etna Forge, Samuel Isett, Yellow Springs, Blair county. Built in 1808; 4 forge fires and 1 hammer; water-power; product, charcoal.

blooms for boiler plate and general purposes, made from pig iron. *See Charcoal Furnaces.*

New Market Forge, Light Brothers, Palmyra, Lebanon county. Product, blooms.

Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862; 5 forge fires, 1 run-out fire, and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,500 net tons.

Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county. Very old works; 3 forge fires and 1 run-out; water-power; product, charcoal blooms.

Sadsbury Forges, Charles Goodman & Brother, Atglen, Chester county. Built about 1820 to make bar iron; began to make blooms about 1850; rebuilt in 1863; 3 forge fires, 1 run-out fire, and 1 hammer; water-power; product, charcoal blooms for boiler plate, made from pig iron.

Schuylkill Steam Forge, B. F. Morret, lessee, (Davis Knauer, owner,) Douglassville, Berks county. Completed in 1878; 8 forge fires and 1 hammer; product, charcoal blooms for boiler plate, made from pig and scrap iron.

Springton Forge, Cornog & McIlvaine, Wallace, Chester county. Built in 1790; 4 forge fires and 1 run-out; water-power; product, charcoal blooms.

Tyrone Forges, Lyon, Shorb & Co., Tyrone, Blair county. Old forge built in 1809; new forge, in 1870; 12 forge fires and 1 steam hammer; steam and water power; product, slabs for boiler plate, made from cold-blast, neutral, charcoal pig iron, brought from Pennsylvania Furnace, Huntingdon county. *See Charcoal Furnaces.*

Union Forge, Union Forge P. O., Lebanon county. Built in 1845; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and sheet iron, made from pig iron.

Washington Forge, Lamar, Clinton county. Product, blooms. *See Charcoal Furnaces.*

Number of bloomaries in Pennsylvania: 36.

ABANDONED.

Cold Spring Forge, Tyrone.

Logan Works, Lewistown.

Monroe Forge, Lebanon county.

North Kiln Forge, Shartlesville, Berks county.

MARYLAND.

Northeast Forge, McCullough Iron Co., Northeast, Cecil county. Built in 1847 and 1875; 16 forge fires and 2 hammers; product, charcoal

blooms for sheet iron exclusively, made from scrap and pig iron ; annual capacity, 6,000 net tons. *See Rolling Mills in Maryland and Delaware.*

Number of bloomaries in Maryland : 1.

WEST VIRGINIA.

Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county. Built in 1874 ; 4 fires ; product, charcoal blooms. *See Charcoal Furnaces.*

Number of bloomaries in West Virginia : 1.

VIRGINIA.

Crockett, Sanders & Co., Wytheville, Wythe county. Built in 1863 ; 2 fires ; product, charcoal blooms ; annual capacity, 250 net tons. *See Charcoal Furnaces.*

Graham's Forge, Graham & Robinson, Graham's Forge P. O., Wythe county. Built in 1827 ; 2 forge fires and 1 hammer ; water-power ; product, bar and other iron, from charcoal pig iron. *See Charcoal Furnaces. See Rolling Mills.*

Gray Eagle Forge, David Huddle, Red Bluff, Wythe county. Built in 1862 ; 3 forge fires and 1 hammer ; water-power ; product, charcoal blooms for boiler plate, made from scrap and pig iron ; annual capacity, 250 net tons. *See Charcoal Furnaces.*

Liberty Forge, Wiesler, Armstrong & Stone, Liberty Furnace, Shenandoah county. Built in 1828 and rebuilt in 1867 ; 4 forge fires and 1 hammer ; water-power ; product, charcoal blooms for general purposes, made from pig iron. *See Charcoal Furnaces.*

Mount Vernon Iron Works, Weyer's Cave, Rockingham county. Philadelphia office, 220 South Fourth st. Built in 1848 ; 5 fires and 1 hammer ; water-power ; product, charcoal blooms for general purposes, made from pig iron. *See Charcoal Furnaces.*

Pine Forge, James Leonard, Mount Jackson, Shenandoah county. Rebuilt in 1874 ; 1 forge fire, 2 hammers, 1 refinery, and 3 knobbling fires ; water-power ; product, blooms and bar iron ; annual capacity, 500 net tons.

Porter's Forge, A. L. Porter & Co., Speedwell P. O., or Porter's Forge P. O., Wythe county. Built in 1865 ; 2 forge fires and 1 hammer ; water-power ; product, charcoal blooms for boiler plate, made from cold-blast charcoal pig iron ; annual capacity, 300 net tons.

Shenandoah Iron Works, Wm. Milnes, Jr., Shenandoah Iron Works,

Page county. Built in 1871; 7 forge fires and 1 6-tuyere run-out; product, charcoal blooms for boiler plate and flange iron, made from pig iron; annual capacity, 1,800 net tons. *See Charcoal Furnaces.*

Number of bloomaries in Virginia: 8.

NORTH CAROLINA.

Rehoboth Forge, John Leonard & Co., Iron Station, Lincoln county.

Product, charcoal blooms; yearly capacity, 400 net tons. *See Furnaces.*

Number of bloomaries in North Carolina: 1.

OHIO.

Paulding Forge, Paulding Furnace Co., Cecil, Paulding county. Built in 1867; 8 forge fires and 1 steam hammer; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,500 net tons, ~~single turn.~~ *See Charcoal Furnaces.*

Number of bloomaries in Ohio: 1.

MISSOURI.

Germania Iron Works, Anthony Zeitinger, South St. Louis, St. Louis county. Built in 1871; 7 knobbling fires and 2 steam hammers; product, charcoal blooms for boiler plate and sheet iron, and billets for carriage bolts and tack plate, made from pig iron; annual capacity, 1,500 net tons blooms, and 400 net tons billets.

Maramec Iron Works, William James, Maramec Iron Works, Phelps county. 8 forge fires; water-power; product, charcoal blooms. *See Charcoal Furnaces.*

Number of bloomaries in Missouri: 2.

Total number of bloomaries in the United States: 58.

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