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THE  
IRON AND STEEL WORKS  
OF THE  
UNITED STATES.

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1886.

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1886

Charles E. Clapp.

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PRESENTED BY

Mr. W. C. Clapp







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

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

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PREPARED AND PUBLISHED BY  
THE AMERICAN IRON AND STEEL ASSOCIATION.

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Directory to the iron and  
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Association,

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## PREFACE.

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THE eighth edition of the Directory of the American Iron and Steel Association to the Iron and Steel Works of the United States is herewith presented. It embodies a most thorough and painstaking revision of the preceding edition, issued in 1884, and to this have been added many new and valuable features. Each of these new features meets a special want of the American iron trade. The present volume embraces a complete list of all the blast furnaces, rolling mills, steel works, forges, bloomaries, nail works, wire mills, wire-nail works, car works, car-axle works, car-wheel works, locomotive works, and iron pipe works in the United States, all properly classified and alphabetically arranged. A table of contents and a very full index will enable the reader to quickly find any description desired. As heretofore, while aiming to give all needful information relating to the location, ownership, capacity, and characteristics of the iron and steel works of the country, the most rigid rules of compression have been applied to each description, all unnecessary verbiage being excluded. A comparison of the results obtained by the revision of 1884 and the present revision shows many important changes.

In the present revision it will be observed that only 578 blast furnaces are described as active or likely to become active, whereas in the edition of two years ago 675 were described, or 97 more than now. The explanation of this great shrinkage in the number of active or probably only temporarily inactive blast furnaces is simply this, that we have now applied heroic treatment to a large number of furnaces which ought to have been placed in the list of abandoned or likely to be permanently inactive furnaces years ago. Many furnaces which were honored with a full description in 1884 and classed in the active list are now relegated to the abandoned list. While carefully guarding against injustice to the owner or owners of any furnace which is reasonably certain to make pig iron in the near or even distant future, we have regarded it as wholly misleading and deceptive to longer continue in the active list any furnace which is not at all likely ever again to be put in blast. In the preface to the edition of the Directory for 1884 the opinion was expressed that "the whole number of furnaces in this country to-day which are in blast or will ever be put in blast does not exceed 600, instead of the 675 of which this Directory furnishes a description." The present edition of the Directory conforms to this opinion and the details presented will be found to fully justify it.

The furnaces which constitute the active list in the present edition

possess a very much higher average capacity, and are consequently of a very much higher average type, than those which were embraced in the same list in previous editions. Thus, in the edition of two years ago, to go no further back, 675 furnaces were credited with a total annual capacity of 9,300,000 net tons, or an average of 13,777 tons each. In the present edition 578 furnaces are credited with a total annual capacity of 9,960,700 net tons, or 17,233 tons each. The furnaces which have been built in recent years are chiefly of large size and modern equipment, while those which we now transfer to the abandoned list are chiefly of small size and antiquated equipment. The figures of total annual capacity which we give are derived from individual returns of furnace owners, and are based upon the assumption that it is possible for all the furnaces in the active list to be in blast for a whole year. As this condition is impossible under the most favorable circumstances it follows that the actual aggregate capacity of the furnaces of the country is much less than the nominal capacity.

The number of completed rolling mills and steel works described in the Directory for 1884 was 434, with 4 building, but in the edition for 1886 only 423 are described, with 13 building. The slightly decreased number of rolling mills and steel works in 1886, notwithstanding the great increase since 1884 in the erection of steel plants, is accounted for partly by the fact that a number of rolling mills which were built to roll iron rails have been wholly abandoned, and partly by the fact that the increasing use of steel tends to diminish the demand for the products of iron rolling mills. These influences are made very apparent in the figures which relate to puddling and heating furnaces. In the edition for 1884 the number of puddling furnaces recorded was 5,265, and of heating furnaces, 2,782. In the present edition the number of puddling furnaces recorded is 4,888, and of heating furnaces, 2,563. The number of trains of rolls has also decreased, the number in the edition for 1884 being 1,555, and in the present edition, 1,475. With the advance of steel the puddling furnace is less and less used, while fewer heating furnaces and trains of rolls are needed.

The annual capacity of the rolling mills in finished iron and steel is virtually the same now as in 1884, being 7,600,000 net tons in 1884 and 7,613,000 tons in 1886. One explanation is that the increased rolling capacity of the steel works has supplanted the rolling capacity of iron rolling mills. Another explanation is that many of the iron rolling mills which have not yielded to the aggressions of steel have had no inducement in the prices obtained for their products to increase their rolling capacity.

In the Directory for 1884 the fact was mentioned that in the preceding two years there had been a great increase in the number of establishments devoted to the manufacture of cut nails and spikes. Only a slight increase from 1884 to 1886 is now noted in the number of such works, from 81 to 83, but there has been in the same time a



large increase in the number of nail machines. From 1882 to 1884 these machines increased from 4,030 to 5,695, and in 1886 there was an increase to 6,355. Many of the new machines erected since 1884 were built to make steel nails.

In September, 1884, the country contained 20 standard Bessemer steel works, with 45 converters, and one new plant in course of erection. In August, 1886, when the present edition of the Directory was printed, the number of standard Bessemer steel works was 27, with 58 converters, and 7 new plants in course of erection. These figures indicate a great stride in this important industry in the last two years. This increase has been chiefly in the erection of small plants to make nail plate for steel nails and billets for machinery steel, wire rods, wire, and miscellaneous purposes. Only two works which may roll steel rails as part of their product have been undertaken since September, 1884, and these are not yet in operation. The annual ingot capacity of the completed and unfinished Bessemer works increased from 2,490,000 net tons in 1884 to 4,102,000 tons in 1886. This increase will attract attention. It is the result partly of the erection of new plants but chiefly of the improved practice and increased machinery of the old works. All of the Bessemer plants erected in the last two years or now in course of erection are of the standard Bessemer pattern. No basic plant has ever been erected in this country, and we know of none that is now proposed.

The erection of Clapp-Griffiths steel plants has made remarkable progress since 1884. When the Directory for that year was published there was but one in the country; now there are 6 completed works and 2 in course of erection, the whole number to embrace 13 converters. The annual ingot capacity of these 8 works is to be 200,000 net tons; in 1884 the single plant then in existence was credited with an annual capacity of only 5,000 tons. The Clapp-Griffiths steel made in this country is largely used for nail plate and wire rods, but it is also used for many other purposes for which iron has been used.

In September, 1884, there were 35 completed open-hearth steel works in the United States, and 3 new works in course of erection. In August, 1886, there were 42 completed works and 7 in course of erection. The open-hearth works in 1884, completed and building, embraced 63 furnaces, and in 1886 they embraced 91 furnaces. In 1884 the ingot capacity per annum of the works then completed and building was estimated by the manufacturers at 550,000 net tons, and in 1886 it was similarly estimated at 660,000 tons. Our open-hearth steel industry is now manifesting much more activity than formerly, and we look for it to make steady progress from year to year.

Our Bessemer steel industry and our open-hearth steel industry, contrary to the general opinion, are now located in many States, each in 11 States, or together in 14 different States. The Clapp-Griffiths process, which is first cousin to the Bessemer process, is also located in many sections of the country, being found to-day in 3 States.

Our crucible cast-steel industry is scarcely holding its own in the struggle with steel made by cheaper and more modern methods. At the date of publication of our Directory in 1884 the country contained 41 works, with 3,594 steel-melting pots, and an annual capacity of 115,000 net tons of ingots. In August, 1886, we had 40 works, with 3,391 steel-melting pots, and an annual capacity of 110,000 tons of ingots. Open-hearth steel is the leading rival of crucible steel. Many of our crucible steel manufacturers are adding open-hearth furnaces to their crucible plants. For locomotive boilers and fire-boxes, locomotive and car springs, and agricultural machinery the use of open-hearth steel is rapidly growing, but for all the more delicate purposes for which crucible steel has heretofore been used, especially fine springs and fine tools either with or without cutting edges, it will always be in demand.

The number of forges which make wrought iron direct from iron ore has decreased from 70 in 1884 to 50 in 1886. This decrease has been chiefly in the Southern States, where cheap rolled bar iron is steadily supplanting the hammered bar iron of the forges. Cheap steel is also interfering with the progress of this primitive branch of our iron trade, and the same remark may be made of the manufacture in old-fashioned bloomeries of blooms from pig and scrap iron. In 1884 we had 53 bloomeries, and in 1886 we had but 42. In 1884 the annual capacity of our forges which make blooms from ore was 75,000 net tons, and in 1886 it was 70,000 tons. In 1884 the annual capacity of the bloomeries which make blooms from pig iron and scrap iron was 70,000 net tons, and in 1886 it was 65,000 tons.

The lists of wire-rod and wire mills, wire-nail works, car works, car-axle works, car-wheel works, locomotive works, and iron pipe works which appear in the present edition of the Directory are the most complete that have ever been printed, and will be found to be of great value to the manufacturers of iron and steel. Most of these lists are new features of the Directory. There are enumerated 57 wire-rod and wire mills, 27 wire-nail works, 85 car works, 76 car-axle works, 108 car-wheel works, 25 locomotive works, 25 wrought-iron pipe works, and 31 cast-iron pipe works.

Many curious and interesting facts appear in the pages of the Directory which give to them a historical as well as descriptive value.

The oldest furnaces in the country are Oxford, in New Jersey, and Cornwall, in Pennsylvania, both built in 1742. We regret to learn that Oxford is now out of blast and not likely to make any more pig iron. Cornwall is now idle, but has not been abandoned.

All the furnaces in New England now use charcoal. The furnace at West Stockbridge, Massachusetts, was the last to use anthracite, and it has been out of blast for several years. Vermont, which once had several active furnaces, has not had a furnace in blast since 1882. There is not now one charcoal furnace in New Jersey, where formerly there were many.

The manufacture of pig iron with coke made in Central and Western Pennsylvania has made rapid progress in many eastern localities in late years. This fuel is now largely used as a mixture with anthracite in furnaces which formerly used anthracite exclusively. The use of raw coal in furnaces west of Pittsburgh is also rapidly giving way to coke.

Carnegie Brothers & Co. Limited are now building two furnaces at their Edgar Thomson works, which when completed will make seven in all. These seven furnaces will have a combined annual capacity of 450,000 net tons of pig iron. Adding the capacity of the two Lucy furnaces to that of the Edgar Thomson furnaces, the whole nine furnaces being practically under one management, the total capacity of the nine furnaces is 600,000 net tons per annum. This is the largest annual capacity of any furnaces under one management in this country. The next largest is that of the furnaces of the North Chicago Rolling Mill Company, at Chicago and Milwaukee, 432,000 net tons. The capacity of the Carnegie system is probably the largest furnace capacity under one management in the world.

Allegheny county, Pennsylvania, built its first furnace in this century (Clinton) as late as 1859; it now has 17 completed furnaces and 3 in course of erection. No other section of the country has made as rapid progress in the manufacture of pig iron as Allegheny county.

Notwithstanding the tendency in late years to build large furnaces, each of which will do the work of a dozen or a score of the old furnaces, there are still to be found running in Pennsylvania, Virginia, and some other States small and old-fashioned cold-blast charcoal furnaces which make only five or six tons of pig iron daily.

Speaking of Pennsylvania, there are yet remaining in this State of rich mineral fuel 24 charcoal furnaces. No two of these furnaces are under one management. Ohio still has 16 charcoal furnaces in the Hanging Rock region, but only one outside of that district.

The Hanging Rock charcoal furnaces are generally banked up on Sunday, and blast is also stopped on this day in some of the bituminous furnaces of the district. There is also a charcoal furnace in Michigan which stops its blast on Sunday.

The great shrinkage in the number of blast furnaces in Kentucky certainly ought not to have happened. There are now only 6 furnaces in the State that do not belong in the abandoned list. We have transferred to this list in recent years 15 charcoal furnaces and one bituminous furnace. Not one new furnace has been built in Kentucky since 1881, and the two furnaces built in that year have been abandoned.

Only 2 furnaces are now left in Indiana. In Michigan all the furnaces use charcoal, except one, and it has not been in operation for years.

The manufacture of coke pig iron is now general in most of the Southern States which have a pig-iron industry. Only a few years

ago these States made only charcoal pig iron. The introduction of the use of coke in the Southern States has most benefited the pig-iron industry of Virginia, Tennessee, and Alabama.

The oldest iron-ore mine in the United States that is now in operation is the Iron Hill mine in Delaware, which was discovered as early as 1684 and soon afterwards opened. Ore is still taken from this mine and used in Principio Furnace, Maryland, the first stack for which furnace was built in 1723. Although the Iron Hill mine supplies ore to a Maryland furnace, there is now no furnace in Delaware, in which State it is located, nor has there been for many years.

Philadelphia is usually referred to as a leading iron centre, and so it is if its immediate surroundings be considered, but it does not itself produce much iron or steel. Its iron and steel industries have made no headway whatever in the last fifteen years. Nor does Cincinnati make any progress as an iron centre. It is not so prominent in this respect as it was in the palmy days of the Hanging Rock region. It is conspicuously lacking in a single steel plant of any description whatever. Upon the other hand, Pittsburgh and Chicago are making rapid progress in producing iron and steel, and to-day they are the great iron and steel cities of the country. Cleveland and Wheeling more than hold their own as producers of iron and steel, and San Francisco is also making steady progress; but Milwaukee, Detroit, St. Louis, Boston, and Baltimore are not so active as they have been, while Buffalo, once active, has almost ceased to be regarded as an iron city. This list embraces all of our large cities which have been prominent in the manufacture of iron or steel. New York City never attained any prominence in this direction.

Two years ago not more than six rolling mills and steel works in the United States used natural gas as fuel; now we have a record of 68 rolling mills and steel works which use the new fuel, and of 16 which are making preparations to use it. Every rolling mill and steel works in Allegheny county, Pennsylvania, 55 in all, now uses natural gas. In Western Pennsylvania outside of Allegheny county it is used in 12 mills and steel works, and 7 others, including the rolling-mill and Gautier departments of the Cambria Iron Works, seventy-nine miles east of Pittsburgh, are preparing to use it. One rolling mill in Ohio is now using it, and 8 mills are getting ready to use it. At Wheeling, West Virginia, one mill is making arrangements to introduce it. In all but a very few of the mills and steel works referred to natural gas is used as fuel exclusively.

# SUMMARY.

IRON AND STEEL WORKS.	July 15, 1886.	September 1, 1884.
Number of completed Blast Furnaces, . . . . .	578	675
Number of Blast Furnaces building on July 15, 1886,—12 Bituminous, 4 Anthracite, and 3 Charcoal; total, . . . . .	19	16
Annual capacity of completed Blast Furnaces, in pig iron, net tons, . . . . .	9,960,700	9,300,000
Annual capacity of the Bituminous Furnaces, net tons, . . . . .	5,709,500	4,850,000
Annual capacity of the Anthracite Furnaces, net tons, . . . . .	3,106,200	3,175,000
Annual capacity of the Charcoal Furnaces, net tons, . . . . .	1,145,000	1,275,000
Number of completed Rolling Mills and Steel Works, . . . . .	423	434
Number of Rolling Mills and Steel Works building, . . . . .	13	4
Number of Single Puddling Furnaces (a double furnace counting as two single ones), . . . . .	4,888	5,265
Number of Heating Furnaces, . . . . .	2,563	2,782
Number of Trains of Rolls, . . . . .	1,475	1,555
Annual capacity of Rolling Mills in finished iron and steel, net tons, . . . . .	7,613,000	7,600,000
Number of Rolling Mills having Nail Factories, . . . . .	83	81
Number of Nail Machines, . . . . .	6,355	5,695
Number of Nail Factories building, . . . . .	2	2
Number of Nail Machines to be used in the new Factories, . . . . .	175	67
Number of completed Bessemer Steel Works, . . . . .	27	20
Number of Bessemer Steel Works building, . . . . .	7	1
Number of Bessemer Converters on July 15, 1886,—58 completed and 12 building, . . . . .	58	45
Annual capacity in ingots, net tons, . . . . .	4,102,000	2,490,000
Number of completed Clapp-Griffiths Steel Works, . . . . .	6	1
Number of Clapp-Griffiths Steel Works building, . . . . .	2	.. .
Number of Clapp-Griffiths Converters July 15, 1886,—10 completed and 3 building, . . . . .	10	1
Annual capacity in ingots, net tons, . . . . .	200,000	5,000
Number of completed Open-hearth Steel Works, . . . . .	42	35
Number of Open-hearth Steel Works building, . . . . .	7	3
Number of Open-hearth Furnaces on July 15, 1886,—71 completed, 18 building, and 2 standing nearly completed, . . . . .	71	58
Annual capacity in ingots, net tons, . . . . .	660,000	550,000
Number of completed Crucible Cast-steel Works, . . . . .	40	41
Number of Steel-melting Pots, . . . . .	3,391	3,594
Annual capacity in ingots, net tons, . . . . .	110,000	115,000
Number of completed Forges, making wrought iron from ore, . . . . .	50	70
Annual capacity in blooms and billets, net tons, . . . . .	70,000	75,000
Number of completed Bloomaries, making blooms from pig and scrap iron, . . . . .	42	53
Annual capacity in blooms, net tons, . . . . .	65,000	70,000





THE  
IRON AND STEEL WORKS  
OF  
THE UNITED STATES.  

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BLAST FURNACES.

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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. The telegraph address is given only when it is not the same as the post-office address. Where the kind of power is not mentioned steam-power will be understood. As most furnaces now have closed tops notice is taken only of those having open tops. For the sake of brevity iron hot-blast stoves are not included in the descriptions given. The size of each furnace stack is indicated by two numbers connected by the character "x;" the larger number being the height of the stack in feet, and the smaller number being its diameter in feet at the bosh. References to other iron works owned by the same parties are made in italics. The names of the officers of incorporated companies are printed in connection with rolling mills when both furnaces and rolling mills are owned by them. This Association is not responsible for statements of the kind of product made, nor for the capacity given.

A list of furnaces which have been *abandoned* or which are likely to remain *inactive* for a long period of time will be found separately printed from the list of *active* furnaces which is given herewith.

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MAINE.

CHARCOAL.

Katahdin Furnace, Katahdin Charcoal Iron Company, Bangor. Furnace at Katahdin Iron Works P. O., Piscataquis county. One stack, 50 x 9, built in 1846, rebuilt in 1874, burned in 1883, and rebuilt in 1885; hot blast; water-power; fuel, charcoal; ore, limonite, yielding from 50 to 55 per cent., obtained about a mile from the works, and roasted in a Davis & Colby calcining kiln; annual capacity, 6,000 net tons. Specialty, car-wheel pig iron. Brand, "Katahdin." Charles A. Lord, President; H. McLaughlin, Treasurer; O. W. Davis, Jr., General Manager.

Number of furnaces in Maine: one charcoal stack.

## MASSACHUSETTS.

## CHARCOAL.

Lanesborough Furnace, John L. Colby, Lanesborough, Berkshire county. One stack, 33 x 9½, built in 1847, burned June 25, 1882, and rebuilt in 1882-3; hot blast; ore, local brown hematite; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron.

Richmond Iron Works, Richmond Furnace P. O., Berkshire county. Three stacks, all in Berkshire county: Richmond Furnace, at Richmond, 32 x 9, built in 1829, and rebuilt in 1863; steam-power. Van Deusenville Furnace, at Van Deusenville, 32 x 9, built in 1834, rebuilt in 1858; water-power. Cheshire Furnace, at Cheshire, 32 x 9, built in 1850, and rebuilt in 1870; steam-power. All use warm blast; ore, brown hematite, from mines owned by the works; total annual capacity, 10,000 net tons of foundry pig iron for cannon, car-wheels, and machinery. Product known as "Richmond" iron. Main office at Richmond Furnace. William H. Barnum, President and General Manager, Lime Rock, Conn.; George Church, Treasurer, Great Barrington, Mass.

Number of furnaces in Massachusetts: 4 charcoal stacks.

## CONNECTICUT.

## CHARCOAL.

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

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

Cornwall Bridge Iron Company, Cornwall Bridge, Litchfield county. One stack, 32 x 9, built in 1833; hot blast; water-power. William H. Barnum, President, Lime Rock; James A. Bierce, Treasurer and Secretary.

Hunts Lyman Iron Company, Huntsville, Litchfield county. Telegraph address, Falls Village. One stack, 32 x 9, built in 1847; cold blast; water-power; open top; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 5,000 net tons. George Church, President;

Samuel W. Bradley, Secretary; William H. Barnum, Treasurer, and Charles W. Barnum, Assistant Treasurer, Lime Rock.

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

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

Sharon Valley Iron Company, Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; open top; hot blast; water-power; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 3,500 net tons. William H. Barnum, President; Charles W. Barnum, Treasurer; Milo B. Richardson, Secretary.

Number of furnaces in Connecticut: 9 charcoal stacks.

## NEW YORK.

### ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Albany City Iron Company, Albany, Albany county. Two stacks, each 60 x 16, built in 1873-4; fuel, anthracite and coke; total annual capacity, 30,000 net tons. Brand, "Olcott." William R. Hills, President and Treasurer; Rufus K. Townsend, Secretary. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Burden Iron Works, The Burden Iron Company, Troy, Rensselaer county. Two stacks, each 60 x 16, built in 1865 and 1867; ores, magnetic from Northern New York and hematite from Eastern New York; total annual capacity, 30,000 net tons. *See Rolling Mills.*

Cedar Point Furnace, Port Henry Steel and Iron Company Limited, Port Henry, Essex county. Main office, 33 Broad st., New York. One stack, 71 x 15, built in 1872-3, first put in blast August 12, 1875; four 22-foot Whitwell stoves; fuel, anthracite and coke; ores, Old Bed Lake Champlain and New Bed Bessemer Lake Champlain; product, Bessemer pig iron; annual capacity, 26,000 net tons. Brand, "Cedar Point." John D. Slayback, President; Andrew Dickey, Treasurer and General Manager. Selling agents, George W. Stetson & Co., 69 Wall st., New York. *See Steel Works.*

Charlotte Furnace, Charlotte Iron Works, 15 Powers' Block, Rochester, Monroe county. Furnace at Charlotte, 7 miles from Rochester, at the mouth of the Genesee river. One stack, 65 x 15, built in 1868, and rebuilt in 1884; fuel, anthracite and coke; ore, local hematite; annual capacity, 20,000 net tons. Specialty, foundry pig iron. Brand, "Char-

lotte." George B. Smith, President; A. S. Clarke, Secretary and Treasurer; William John Pollock, Superintendent.

Clove Furnace, C. M. Nichols, Agent for Receiver Parrott Iron Company, Greenwood Iron Works P. O., Orange county. Telegraph address, Greenwood. One stack, 55 x 16, built in 1854; steam and water power; fuel, anthracite and coke; ore, magnetic, obtained from near the furnace and from New Jersey; product, foundry pig iron; annual capacity, 13,500 net tons. Brand, "Clove." Stuyvesant Fish, Receiver, 214 Broadway, New York.

Cold Spring Furnace, West Point Furnace Company, Cold Spring, Putnam county. One stack, 60 x 15½, built in 1863; ores, Hudson River roasted carbonate and New York magnetics; product, neutral forge and foundry and Bessemer pig iron; annual capacity, 17,000 net tons. Brand, "West Point." Joseph C. Kent, President, Phillipsburg, N. J.; J. Wesley Pullman, Secretary and Treasurer, 240 South Third st., Philadelphia. Selling agents, Crocker Brothers, 32 Cliff st., New York.

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

Dutchess Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 50 x 12, built in 1873 for charcoal and enlarged and changed to anthracite in 1877; open top, with "hat;" fuel, anthracite and coke; ores, ⅔ local hematite and ⅓ magnetic from Port Henry mines; product, No. 1 and No. 2 X foundry and chilling pig iron; annual capacity, 8,400 net tons. Brand, "Dutchess Iron." Not in blast since June, 1882. Offered for sale by the executors of the estate of James Brown. John S. Schultze, President and Treasurer, 59 Wall st., New York. *See Clove Spring (charcoal) Furnace.*

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

Fallkill Iron Company, Albert Tower, President and Agent, Poughkeepsie, Dutchess county. Two stacks, each 60 x 16, built in 1860; ores, ⅓ Dutchess county brown hematite, ⅔ Lake Champlain magnetic,

and  $\frac{1}{2}$  Forest of Dean, Orange county; total annual capacity, 30,000 net tons. H. M. Braem, Secretary, New York. Selling agents, Edward Bech & Co., 69 Wall st., New York.

Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. Two stacks: No. 1, 54 x 14, built in 1870; No. 2, 70 x 14, built in 1871, and remodeled in 1883, three fire-brick hot-blast stoves having been added; fuel, anthracite and coke; ore, local fossil; product, pig iron for stove plates and small castings; total annual capacity, 36,000 net tons. E. L. Hedstrom, President, Buffalo; E. F. Holden, Treasurer, Syracuse; C. H. Smyth, Secretary and Superintendent, at the works.

Furnaceville Iron Company, Rochester. Furnace formerly called Ontario Furnace, situated at Furnaceville, Wayne county. One stack, 50 x 13, first put in blast in October, 1870, and rebuilt in 1880; fuel, anthracite and coke; ore, Wayne county hematite; product, neutral pig iron; annual capacity, 12,000 net tons. Brand, "Furnaceville." Present company organized March 10, 1880. E. H. Harriman, President, and W. M. Harriman, Vice-President, 17 Wall st., New York; W. H. Averell, Secretary and Treasurer; E. M. Parrott, Manager.

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

Kirkland Furnace, Kirkland Iron Company, Kirkland, Oneida county. Telegraph address, Utica. One stack, 65 x 14, built in 1873, reconstructed in 1882, and changed from water to steam power; fuel, anthracite coal and coke; ores, local and Northern New York hematite or fossiliferous and Lake Champlain and Canadian magnetic; annual capacity, 18,000 net tons. Specialty, foundry pig iron. Brand, "Kirkland." Theodore W. Dwight, President; I. A. Williams, General Manager and Treasurer, Utica, N. Y.

Manhattan Iron Works, Manhattan Iron Works Company, Manhattanville, New York City. Two stacks, 49 x 12 $\frac{1}{2}$  and 49 x 13, built in 1851 and 1857; fuel, anthracite coal; ores, magnetic from Lake Champlain and hematite from Sharon, on the New York and Harlem Railroad; product, neutral pig iron, suitable for foundry or mill purposes; total annual capacity, 18,000 net tons. B. W. Van Voorhis, President; William W. Van Voorhis, Treasurer; Charles Brock, Secretary; M. Harris, Superintendent.

Onondaga Iron Company, Syracuse. Works at Geddes, Onondaga county. Two stacks, each 65 x 15 $\frac{1}{2}$ ; No. 1 built in 1869-70, blown in June 17, 1870; No. 2 built in 1872, blown in November 14, 1872; fuel, Connelville coke and anthracite coal; ores, from Ontario, Clinton, and Jefferson counties, New York; product known as "Onondaga" pig

iron; total annual capacity, 36,000 net tons. Foundry and mill pig iron are produced; quality nearly neutral, cold-short tendency, well adapted for boiler plate, hoops, and bands. James J. Belden, President; R. Nelson Gere, Vice-President; A. J. Belden, Secretary and Treasurer; W. H. H. Gere, Manager.

Peekskill Furnace, Peekskill, Westchester county. For information apply to J. Wesley Pullman, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1853, rebuilt in 1874, and refitted in 1880-1; annual capacity, 15,000 net tons. Brand, "Peekskill." Croft Mine, Putnam county, and Croft Mine Railroad form part of this property. W. H. Campbell, Superintendent, Peekskill.

Port Henry Furnaces, Bay State Iron Company, W. T. Foote, Agent, Port Henry, Essex county. General office, 191 High st., Boston, Mass. Two stacks, situated on the bank of Lake Champlain, each 66 x 16, built in 1853 and 1861, rebuilt in 1868 and 1871, respectively; ores, Lake Champlain, Chateaugay, and red ore from St. Lawrence county; product, forge and foundry pig iron; total annual capacity, 30,000 net tons. Brands, "Port Henry" and "Bay State." Not in blast since 1883; property to be sold under foreclosure. *See Rolling Mills in Massachusetts.*

Sterling Iron and Railway Company, 45 William st., P. O. Box 1,384, New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 13, built as a charcoal furnace in 1806, converted to anthracite in 1868; and Sterling, 42 x 14, built as a charcoal furnace in 1848, converted to anthracite in 1866; ores, magnetic, mined on the company's property near the furnaces; product, foundry and mill pig iron; total annual capacity, 15,000 net tons. Iron called "Sterling." A. W. Humphreys, President.

Troy Steel and Iron Company, Troy, Rensselaer county. Three stacks in course of erection, each 80 x 18; fuel to be anthracite and coke; 12 Whitwell fire-brick stoves; ores, magnetite from Franklin county, and carbonate from Columbia county; product, Bessemer pig iron; total estimated annual capacity, 160,000 net tons. *See Rolling Mills.*

Number of anthracite and mixed anthracite and coke furnaces in New York: 30 completed stacks and 3 stacks building.

#### CHARCOAL.

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

Clove Spring Furnace, Clove Spring Iron Works, Clove Valley P. O.,



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

Copake Iron Works, Frederick Miles, Copake Iron Works, Columbia county. One stack, 32 x 9, built in 1872; open top; warm blast; steam and water power; ore, limonite, mined near the furnace; specialty, car-wheel pig iron; annual capacity, 4,500 net tons. Brand, "Copake." W. A. Miles, Manager.

Gere Iron and Mining Company, Port Leyden, Lewis county. Two stacks, Gracie and Fannie, 50 x 9½ and 50 x 10½ respectively, built in 1864, rebuilt in 1880, and burned and rebuilt in 1881; hot or cold blast; Black river water-power; ores, Jefferson county, Old Sterling, Salisbury, and Canadian; Davis & Colby ore roaster; product, car-wheel pig iron, chill graded; total annual capacity, 18,000 net tons. Brand, "Gere." The company has erected works for the distillation of wood, producing charcoal and converting pyroligneous acid into commercial products. D. N. Crouse, President, Utica; W. H. H. Gere, Vice-President, Syracuse; Isaac Maynard, Vice-President, Utica; R. A. Bonta, Secretary and Treasurer, Syracuse; George D. Colby, General Manager, Port Leyden.

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

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

Plattsburgh Furnace, Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. One stack, 55 x 9½, first blown in April 7, 1878, rebuilt in 1885; hot blast; ore, Chateaugay magnetic; product, car-wheel pig iron; annual capacity, 6,000 net tons. A second stack in course of erection. Brand, "Chateaugay." Andrew Williams, President; A. L. Inman, General Manager; Smith M. Weed, Secretary; H. M. Olmsted, Treasurer. *See Forges.*

Wassaic Furnace, N. Gridley & Son, Wassaic, Dutchess county. One stack, 32 x 9½, built in 1826, and rebuilt in 1863; warm blast; water-power; ores, Amenia hematite mined in the neighborhood, and hematite from the Salisbury region; product, pig iron for car-wheels, chilled rolls, and malleable castings. Brand, "Wassaic." Also produce a special iron with unusual tensile strength from carbonate ore. Brand,

"Carboheat." Total annual capacity, 4,000 net tons. Edward Gridley, Manager. Selling agents, Crocker Brothers, 32 Cliff st., New York. Number of charcoal furnaces in New York: 9 completed stacks and one stack building. Total number of furnaces in New York: 39 completed stacks and 4 stacks building.

## NEW JERSEY.

### ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. Three stacks: two 60 x 18, and one 75 x 18, built in 1848; ore, magnetic, from the company's mines; product, all grades of pig iron, with special qualities for plates, sheets, wire, nails, and car-wheel chill; total annual capacity, 50,000 net tons. Brand, "Andover." Philadelphia office, 240 South Third st. Thomas McKean, President; F. A. Comly, Secretary and Treasurer; J. Wesley Pullman, Agent, all at Philadelphia. Superintendent of works, Joseph C. Kent, Phillipsburg.

Boonton Iron Works, Estate of J. Couper Lord, Boonton, Morris county. John S. Schultze, General Manager, 59 Wall st., New York. Two stacks, 70 x 14 and 60 x 16, built in 1848 and 1868, respectively; steam and water power; total annual capacity, 33,600 net tons. *See Rolling Mills.*

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

Franklin Iron Company, Franklin Furnace P. O., Sussex county. One stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; fuel, anthracite and coke; ores, New Jersey and New York; product, Bessemer pig iron; annual capacity, 29,000 net tons. E. F. Hatfield, President, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. W. Pierce, Secretary, Franklin Furnace, N. J.; E. S. Moffat, Manager.

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

New Jersey Zinc and Iron Company, Newark, Essex county. Sales office, 61 Maiden Lane, New York. Two stacks: A, 31 x 8, built in

1885, to take the place of two stacks built in 1855 and 1863; and B, 30 x 8, built in 1883 to take the place of the stack built in 1871; fuel, anthracite; product, spiegeleisen, from zinc residuum; combined annual capacity, 7,500 net tons. B. G. Clarke, President, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. P. Hardenburgh, Manager, Newark.

Oxford Iron Works, Oxford Iron and Nail Company, Oxford, Warren county. Main office, 52 Wall st., New York. One stack, 63 x 17, built in 1871; fuel, anthracite coal; ore, magnetic, mined near the works; product, mill pig iron; annual capacity, 16,000 net tons. (Another stack, 36 x 10, built in 1742, is out of blast and not likely to be put in again.) Product is worked up into nails, etc., by the company, only a small quantity of foundry pig iron being made and sold. J. S. Scranton, sales agent, 83 Washington st., New York. *See Rolling Mills.*

Passaic Zinc Company, 111 Liberty st., New York. Furnace in Hudson county, New Jersey. One stack, 40 x 10, built in 1883, and first put in blast in February, 1884; fuel, anthracite coal; product, spiegeleisen, from zinc residuum; annual capacity, 4,500 net tons. William Reynolds Brown, President; Charles E. Maxwell, Secretary and Treasurer; Aaron Clark, Superintendent. Selling agents, Manning & Squier, 111 Liberty st., New York.

Pequest Furnace, Cooper & Hewitt, Oxford, Warren county. One stack, 67½ x 16½, built in 1874, and rebuilt in 1883; fuel, ½ anthracite coal and ½ Connellsville coke; ore, New Jersey magnetic and foreign; product, foundry, gray forge, and Bessemer pig iron; estimated annual capacity, 25,000 net tons. B. F. Fackenthal, Jr., General Manager. New York office, 17 Burling Slip. *See Ringwood Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

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

Ringwood Furnace, Cooper & Hewitt, Hewitt, Passaic county. One stack, 48 x 13, altered from charcoal to anthracite in 1872; one unfinished stack, 65 x 16; open tops; water-power; ore, magnetic, mined at Ringwood. New York office, 17 Burling Slip. *See Pequest Furnace. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Secaucus Iron Company, Secaucus, Hudson county. Telegraph address, Jersey City. One stack, 65 x 17, completed in 1877, and first blown in in June, 1879; fuel, anthracite and coke; ores, foreign hematites and New York and New Jersey magnetites; product, Bessemer pig iron; annual capacity, 26,000 net tons. Brand, "Secaucus." A. Pardee, Presi-

dent, Hazleton, Pa.; I. P. Pardee, Secretary and Treasurer, Stanhope, N. J.; Kenneth Robertson, Superintendent, Secaucus, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Number of furnaces in New Jersey: 18 anthracite and mixed anthracite and coke stacks.

## PENNSYLVANIA.

### LEHIGH VALLEY—ANTHRACITE OR MIXED ANTHRACITE AND COKE.

Allentown Iron Works, Allentown Iron Company, 222 and 224 South Third st., Philadelphia. Works at Allentown, Lehigh county. Two completed stacks and one stack building: No. 1,  $53\frac{1}{2} \times 14\frac{1}{2}$ , built and blown in in 1846; No. 4,  $60 \times 16\frac{1}{2}$ , building; and No. 5,  $60 \times 17$ , built in 1872, and blown in in 1873; one open and two closed tops; fuel, all anthracite; ores, New York, New Jersey, and Pennsylvania magnetic and local hematite; foundry pig iron is a specialty; total annual capacity, 53,000 net tons. Brand, "Allentown." (Three stacks, built in 1846 and 1853, have been abandoned.) Frederick Prime, Jr., President, 222 South Third st., Philadelphia; John Lowber Welsh, Treasurer; Stephen B. Neumoyer, Superintendent of works.

Allentown (The) Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown. Two stacks, each  $68 \times 15$ , built in 1864; open tops; fuel, anthracite coal; ores, local hematite and New Jersey magnetic; product, mill pig iron; total annual capacity, 24,000 net tons. *See Rolling Mills.*

Bethlehem (The) Iron Company, Bethlehem, Northampton county. Eight stacks: No. 1,  $61 \times 15\frac{1}{2}$ , built in 1863; No. 2,  $70 \times 16$ , built in 1867; No. 3,  $50 \times 13$ , built in 1868; No. 4,  $70 \times 18$ , built in 1874-5; No. 5,  $70 \times 18$ , built in 1874-5; No. 6,  $70 \times 19$ , built in 1881; No. 7, (North Penn.)  $65 \times 17$ , situated at Bingen, Northampton county, built in 1870; Northampton Furnace,  $65 \times 15$ , situated at Freemansburg, Northampton county, first blown in July 17, 1873. Nos. 2 and 6 are equipped with Siemens-Cowper-Cochrane hot-blast stoves; the others have iron stoves. Product, Bessemer pig iron, from local and foreign hematite and magnetic ores; fuel, anthracite and Connellsville coke; total annual capacity, 160,000 net tons. *See Rolling Mills.*

Carbon Iron Works, Carbon Iron and Pipe Company Limited, Mauch Chunk, Carbon county. Works at Parryville, in the same county. Three stacks,  $52 \times 13$ ,  $52 \times 16$ , and  $65 \times 16$ , built in 1855, 1864, and 1869, respectively; one open and two closed tops; fuel, anthracite coal; ores, hematite from Lehigh, Northampton, and Carbon counties, and magnetic from New Jersey and Lake Champlain; total annual capacity, 30,000 net tons. Product known as "Carbon" iron. The manufacture of cast-iron pipe was commenced in June, 1884. A. A. Douglas, Chairman, Mauch Chunk; George Ruddle, Secretary and Treasurer, Mauch Chunk; H. P. Cooper, Superintendent, Parryville. Selling Agents, George W. Stetson & Co., 69 Wall st., New York.

Coleraine Iron Works, William T. Carter & Co., 302 Walnut st., Philadel-

- phia. Works at Redington, Northampton county. Two stacks, each 60 x 17, built in 1869 and 1872; ores,  $\frac{2}{3}$  hematite and  $\frac{1}{3}$  magnetic; product, foundry pig iron; total annual capacity, 26,000 net tons.
- Coplay Iron Company Limited, Coplay, Lehigh county. Three stacks, 60 x 14, 55 x 16, and 55 x 16, built in 1853, 1862, and 1868, respectively; open tops; ores, Lehigh county hematites and New Jersey magnetics; product, principally foundry pig iron; total annual capacity, 30,000 net tons. E. P. Wilbur, Chairman, Bethlehem; W. H. Ainey, Secretary and Treasurer, Allentown; A. F. K. Krout, Clerk, Coplay; H. Bortz, Superintendent, Allentown.
- Crane Iron Works, Crane Iron Company, 224 South Fourth st., Philadelphia. Works at Catasauqua, Lehigh county. Five stacks: one 75 x 18, three 60 x 17, and one 55 x 17. Original furnaces built in 1839, 1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881. Two have iron hot-blast stoves, and three have Whitwell fire-brick stoves; fuel, anthracite and coke; ores, New Jersey magnetic, Pennsylvania hematite, and foreign; specialties, foundry, open-hearth, and Bessemer pig iron; annual capacity, 110,000 net tons. Brand, "Crane." Samuel Dickson, President; Geo. T. Barns, Secretary and Treasurer. Officers at Catasauqua: Joseph Hunt, Superintendent; John Williams, Cashier.
- Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks county. New York office, 17 Burling Slip. One stack, 75 x 19, built in 1874, and first blown in in February, 1876; eight Cooper-Durham iron hot-blast stoves; fuel, anthracite coal and Connellsville coke; ores, local hematite and magnetic, New Jersey magnetic, and foreign; specialties, gray forge and Bessemer pig iron; annual capacity, 36,000 net tons. Brand, "Durham." The two old stacks, built in 1848 and 1851, have been demolished. B. F. Fackenthal, Jr., General Superintendent. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia. *See Pequest and Ringwood Furnaces, New Jersey.*
- Emaus Furnace, Ormrod, Fisher & Co., lessees, Emaus, Lehigh county. Main office, 226 Walnut st., Philadelphia. One stack, 66 x 16, completed and first put in blast October 10, 1872, rebuilt in 1879-80; fuel, anthracite coal; ores, local hematite and New Jersey magnetic; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Emaus." George Ormrod, Superintendent. During 1883 the lessees of the furnace built a foundry for the production of cast-iron gas and water pipe, with a daily capacity of 33 net tons. Selling agents, Donaldson & Thomas, 226 Walnut st., Philadelphia.
- Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Established in 1843. Five stacks: one 63 x 16, one 81 x 18, one 80 x 18, one 47 x 15, and one 72 x 18. Original furnaces were first blown in in 1844, 1845, 1850, 1852, and 1869; rebuilt in 1851, 1876, 1880, and 1882. These furnaces are at Glendon, near Easton, except Furnace No. 4, which is situated at South Easton. No. 4 is blown by water-power and has the only open top; No. 1 is blown by either

water or steam power; fuel, anthracite, with sometimes a little Snow Shoe coke; ores, hematite from Northampton county, Pa., and magnetic from Morris county, N. J.; specialty, forge pig iron; total annual capacity, 100,000 net tons. Brand, "Glendon." Principal office at Boston, Mass. Augustus Lowell, President, Boston; Thomas T. Bouvé, Secretary and Treasurer, Boston; Frank Firmstone, Superintendent, Easton.

Lehigh Iron Company, Allentown, Lehigh county. Two stacks, 55 x 16 and 60 x 17; No. 1 completed July 22, 1869, and No. 2 October 21, 1872; open tops; fuel, anthracite coal; ores, Lehigh county hematite and New Jersey magnetic; specialty, foundry pig iron; total annual capacity, 21,000 net tons. Brand, "Lehigh." W. H. Ainey, President and Treasurer; H. Bortz, Secretary and Manager of the works.

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

Macungie Furnace, Macungie Iron Company, 205 Walnut Place, Philadelphia. Furnace at Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in September 14, 1874; fuel, anthracite coal; ores, ¾ native hematite and ¼ New Jersey magnetic; specialty, foundry pig iron; annual capacity, 14,000 net tons. Brand, "Macungie." J. Singmaster, President; C. Y. Audenried, Treasurer; R. R. Robb, Secretary; William M. Weaver, Superintendent, Macungie. Selling agents, Robb & Matthews, Philadelphia.

Thomas Iron Works, Thomas Iron Company, Hokendauqua, Lehigh county. Twelve stacks, (eleven owned and one leased,) located as follows: six at Hokendauqua, two (Lock Ridge) at Alburtis, Lehigh county, two (Saucon) at Hellertown, Northampton county, and two (Keystone and Lucy) at Glendon, Northampton county. At Hokendauqua there are two stacks 60 x 16, two 60 x 17, and two 65 x 17, of which two were built in 1855, two in 1863, and two in 1873. Of the Lock Ridge Furnaces at Alburtis one stack is 60 x 14 and one 60 x 16, built in 1867 and 1869. The Keystone Furnace at Glendon is 65 x 16, and was first put in blast April 17, 1876; the Lucy Furnace, also at Glendon, is 65 x 14, and was built in 1872, rebuilt in 1880. The Saucon Furnaces at Hellertown are each 60 x 16, and were first blown in March 25, 1868, and May 25, 1870, respectively. The Keystone Furnace has Whitwell stoves; all others have iron pipe stoves. The Saucon Furnaces use ½ anthracite and ½ coke; all others use anthracite exclusively. All use native hematite and New Jersey magnetic ores; use no foreign ores; product, foundry and forge pig iron; total annual capacity, 200,000 net tons. Brand, "Thomas." Samuel Thomas, President; B. G. Clarke, Vice-President; J. T. Knight, Secretary and Treas-



urer, Easton; John Thomas, General Superintendent; Daniel Davis, Superintendent of Lock Ridge Furnaces; Fletcher H. Knight, Superintendent of Keystone and Lucy Furnaces; Horace Boyd, Superintendent of Saucon Furnaces. Sales made by B. G. Clarke, 52 Wall st., New York; J. T. Knight, Easton; and Lyman & Co., Philadelphia. Number of furnaces in the Lehigh region: 48 completed stacks, and one stack building.

SCHUYLKILL VALLEY—ANTHRACITE OR MIXED ANTHRACITE AND COKE.

Anvil Furnace, Pottstown Iron Company, Pottstown, Montgomery county. One stack, 65 x 15, built in 1867, and blown in in December, 1867; fuel, anthracite and coke; ores, magnetic and hematite; annual capacity, 20,000 net tons. Brand, "Anvil." *See Rolling Mills.*

Chester Furnace, Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. One stack, 70 x 16, first blown in in November, 1881; fuel, anthracite and coke; ore, foreign; equipped with 3 Whitwell stoves; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Chester." *See Rolling Mills.*

Edge Hill Furnace, Joseph E. Thropp & Co., Edge Hill, Montgomery county. One stack, 64 x 16½, built in 1869-72; first blown in in January, 1872; fuel, anthracite and coke; ores, Whitemarsh hematites, other domestic ores, and foreign; product, foundry and gray forge pig iron; annual capacity, about 35,000 net tons. Brand, "Edge Hill."

Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13; one built in 1842, and blown in in August, 1844; the other built in 1855, and blown in in September, 1856; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, No. 2 foundry and gray forge pig iron; total annual capacity, 22,000 net tons. Brand, "Henry Clay." Selling agent, Charles W. Matthews, Philadelphia.

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

Keystone Furnaces of Reading, Keystone Furnace Company, Reading, Berks county. Two stacks: one, 50 x 15, built in 1869; the other, 50 x 14, built in 1872-3, blown in in June, 1873; product, principally foundry pig iron; total annual capacity, 20,500 net tons. Brand, "Bushong." Jacob Bushong, President; H. M. Bushong, Secretary and Treasurer; Henry Bushong, General Manager. Sales agents, Crocker Brothers, 32 Cliff st., New York.

Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One stack, 58 x 16, built in 1852, first blown in in 1853, and rebuilt in 1871; fuel, anthracite coal; ores, local magnetic and hematite; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Leesport."

R. T. Leaf, President, Reading; P. R. Stetson, Secretary and Treasurer, Reading; Morris P. Janney, Superintendent. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia.

Merion and Elizabeth Furnaces, Merion Iron Company, West Conshohocken, Montgomery county. Philadelphia office, 209 Walnut Place. Two stacks: Merion Furnace, 48 x 16, built in 1847, and enlarged in 1876; Elizabeth Furnace, 50 x 16, built in 1872, put in blast October 24, 1872; both stacks remodeled in 1883; ores, New York and New Jersey magnetic and local hematite; product, foundry and forge pig iron; combined capacity, about 700 net tons per week. Brand, "Merion." Specialty, neutral gray forge pig iron for boiler plate and sheet iron. J. B. Moorhead, President.

Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, 50 x 14, built in 1854, and first blown in in 1856, remodeled in 1863 and again in 1869; ores,  $\frac{1}{2}$  magnetic and  $\frac{3}{4}$  hematite; specialty, forge pig iron; annual capacity, 16,000 net tons. Brand, "Montgomery." Abraham S. Patterson, President; Joseph Storm Patterson, Secretary and Treasurer; John W. Eckman, Manager.

Moselem Furnace, Sheble & Stelwagon, Moselem, Berks county. One stack, 49 x 12, built in 1823 for charcoal, and rebuilt several times; annual capacity, 8,000 net tons. H. G. Stelwagon, Manager; J. H. Druckemiller, Superintendent. Not in blast in 1886. For sale.

Mt. Laurel Furnace, Clymer Iron Company, Temple, Berks county. Furnace at Mt. Laurel. One stack, 50 x 12, built in 1836, rebuilt in 1847, and altered for anthracite in 1873, but not afterwards blown in until February 1, 1880; ore, principally hematite; product, foundry pig iron; annual capacity, 10,000 net tons. George E. Clymer, President; Abram Sweitzer, Treasurer and Superintendent. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia. *See Charcoal Furnaces.*

Norristown Iron Works, James Hooven & Son, Norristown, Montgomery county. One stack, 55 x 16, built in 1869, and rebuilt in 1871; open top; fuel, anthracite coal and coke; ores, hematite and magnetic, from Pennsylvania, New Jersey, and foreign countries; product, gray forge pig iron, nearly all of which is used in the firm's rolling mill; annual capacity, 13,500 net tons. James Hooven, owner. *See Rolling Mills.*

Norway Furnace, Gabel, Jones & Gabel, lessees, Pottstown. Furnace at Bechtelsville, Berks county. One stack, 58½ x 15, built in 1875, and first blown in in 1880; open top; fuel, anthracite and coke; ore, Berks county magnetic, Lancaster county hematite, and foreign; product, very soft and strong foundry and very strong mill pig iron; annual capacity, 17,500 net tons. Specialty, No. 1 X pig iron. Brand, "Norway." Jacob H. Gabel, Treasurer; Griffith Jones, Superintendent. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Eight stacks. East Penn Furnaces, at Lyons Station,

Berks county; two stacks, each  $45\frac{1}{2} \times 13\frac{1}{2}$ , built in 1874-5; will probably be rebuilt as a single stack; total annual capacity, 17,000 net tons. Kutztown Furnace, at Kutztown, Berks county; one stack,  $55 \times 14\frac{1}{2}$ , built in 1875; annual capacity, 8,300 net tons. Swede Furnace, at Swedeland, Montgomery county; one stack,  $73 \times 14$ , built in 1850, and rebuilt in 1881; annual capacity, 15,000 net tons. Minersville Furnace, at Minersville, Schuylkill county; one stack,  $55 \times 15$ , first blown in September 5, 1873; rebuilt in 1880; weekly capacity, 200 net tons; out of blast since 1875. Port Carbon Furnace, at Port Carbon, Schuylkill county; one stack,  $65 \times 15$ , first put in blast in September, 1872; rebuilt in 1879 and 1881. Ringgold Furnace, at New Ringgold, Schuylkill county; one stack,  $52 \times 13$ , first blown in February 28, 1874; annual capacity, 7,000 net tons. Monocacy Furnace, Monocacy, Berks county; one stack,  $50 \times 13$ , built at Hopewell in 1852; removed to Monocacy in 1854; annual capacity, 10,000 net tons. (The Emaus Furnace, at Emaus, Lehigh county, and the Norway Furnace, at Bechtelsville, Berks county, are also owned by this company but are operated by other parties on lease and are described in their proper places elsewhere.) Franklin B. Gowen, President; George deB. Keim and Stephen A. Caldwell, Receivers; John Birkinbine, Engineer. *See Virginia (coke) Furnaces. See Rolling Mills.*

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

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Three stacks: No. 1,  $59 \times 15$ , built in 1845, and rebuilt in 1871; No. 2,  $58\frac{1}{2} \times 15$ , built in 1845, and rebuilt in 1871; No. 3,  $59 \times 15$ , built in 1849; fuel, anthracite and coke; ores, magnetic and hematite, from Berks and Chester counties, and New Jersey and foreign; specialty, gray forge pig iron; total annual capacity, 45,000 net tons. Brand, "Phoenix." Wm. St. G. Kent, Superintendent of furnaces. *See Rolling Mills.*

Pioneer Furnaces, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Three stacks: one,  $55 \times 12$ , rebuilt in 1853; one,  $65 \times 13$ , built in 1866; and one,  $65 \times 14$ , built in 1872; fuel, anthracite coal; ores, foreign; product, Bessemer pig iron; total annual capacity, 36,000 net tons. Brand, "Pioneer." *See Rolling Mills.*

Plymouth Rolling Mill Company, Conshohocken, Montgomery county. Philadelphia office, 261 South Fourth st. Three stacks: Plymouth Furnaces at Conshohocken and Lucinda Furnace at Norristown, all in Montgomery county. Plymouth Furnaces have two stacks,  $55 \times 16$  and  $55 \times 14$ , built in 1845 and 1864, respectively; Lucinda Furnace is  $40 \times 13$ , built in 1856; fuel, anthracite and coke; ores, Pennsylvania hematite and magnetic; product, foundry and forge pig iron; total annual capacity, 30,000 net tons. Brand, "Plymouth." *See Rolling Mills.*

Reading Iron Works, Reading, Berks county. Office, 259 South Fourth st., Philadelphia. Two stacks, 55 x 15 and 55 x 16, built in 1854 and 1873, respectively; ore, principally hematite from Lehigh and Lebanon counties; product, foundry and mill pig iron; total annual capacity, 20,000 net tons. *See Rolling Mills.*

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

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

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

Topton Furnace Company, Isaac Eckert, Manager, Topton, Berks county. One stack, 55 x 16, built in 1873. Henry S. Eckert, William M. Kaufman, and Isaac Eckert, owners.

Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery county. One stack, 55½ x 15½, built in 1875, and first blown in in April, 1876; fuel, anthracite and coke; ores, magnetic, from Boyertown and Seisholtzville, Berks county, and from New Jersey; specialty, mill pig iron; annual capacity, 30,000 net tons. Brand, "Warwick." Isaac Fegely, President; V. P. McCully, Secretary; Jacob Fegely, Jr., Treasurer; Edgar S. Cook, Manager.

William Penn Furnace, D. O. Hitner, William Penn P. O., Montgomery county. One stack, 40 x 12½, built in 1854; open top; ores, New York magnetic and local brown hematite; product, foundry and forge pig iron; annual capacity, 6,000 net tons. (Two stacks, one built in 1844 and one built in 1845, were purchased by the Pennsylvania Schuylkill Valley Railroad Company in 1883 and torn down.)

Number of furnaces in the Schuylkill region: 45 stacks.

UPPER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 49 x 14, built in 1853-4, and blown in April 14, 1854, rebuilt in 1881; ores, fossil, mined in the vicinity, and magnetic from New Jersey; product, gray forge and No. 2 foundry pig iron; annual capacity, 11,000 net tons. Brand, "Bloom."

Chulasky Furnace, T. J. Miles & Co., lessees, Danville, Montour county. Works at Chulasky, Northumberland county. One stack, 42 x 14, built in 1846; ores mined on the property; specialty, soft gray forge pig iron; annual capacity, 6,500 net tons.

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

Danville Furnaces, Danville, Montour county. Two stacks, 61 x 16 and 43 x 13, built in 1869 and 1867, respectively; both remodeled in 1884; fuel, anthracite coal and coke; ores, soft fossil and hematite, mined in Montour county (Pa.) and in the Shenandoah Valley (Va.); specialty, neutral foundry and mill pig iron; total annual capacity, 30,000 net tons. Not in blast in 1886. (Last operated by the Danville Furnace Company Limited, of which G. W. Miles was Treasurer and Manager.

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

Irondale Furnaces, Bloomsburg Iron Company, Bloomsburg, Columbia county. Two stacks, 36 x 12 and 36 x 14, built in 1844 and 1845; open tops; water-power; ores, local fossil and New Jersey magnetic; product, principally No. 2 foundry and mill pig iron, made from ore only; total annual capacity, 15,000 net tons. The foundry pig iron is very soft, open-grained, and strong; the mill pig iron is nearly neutral and has great tensile strength. Brand, "Irondale." Charles R. Paxton, President, Bloomsburg; William E. S. Baker, Treasurer, 122 Race st., Philadelphia; E. R. Drinker, Manager.

Lackawanna Furnaces, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Five stacks: two built in 1849, one in 1852, one in 1854, and one in 1872; sizes, 67 x 20½, 65 x 17, 65 x 17, 70 x 17½, and 70 x 19; fuel, anthracite and coke; ores, chiefly magnetite, with some roasted carbonate, from Lake Champlain and Putnam county, New York; product, Bessemer pig iron; total annual capacity, 110,000 net tons. Brand, "Lackawanna." E. S. Moffat, Superintendent of furnaces. New York office, 52 Wall st. *See Rolling Mills.*

Marshall Furnace, Marshall Brothers, Newport, Perry county. Philadelphia office, No. 24 Girard avenue. One stack, 60 x 13, built in 1872, and blown in in July, 1872; fuel, anthracite and coke; ores, local magnetic, fossil, and hematite; product, foundry pig iron and gray forge for sheet and plate iron; annual capacity, 15,000 net tons. Brand, "Marshall." P. Hiestand, Superintendent.

Montour Iron and Steel Company, Danville, Montour county. Philadelphia office, 216 South Third st. Two stacks, each 52 x 15, built in

1842; fuel, anthracite and Clearfield coke; ores, local fossil; product, cold-short foundry pig iron; total annual capacity, 24,000 net tons. (A third stack was abandoned in 1880.) *See Rolling Mills.*

Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; ore, fossil; product, principally foundry iron; annual capacity, 7,000 net tons. Dr. L. Rooke, Manager. Number of furnaces in the Upper Susquehanna region: 18 stacks.

LOWER SUSQUEHANNA—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Aurora Furnace, Wrightsville Iron Company, Wrightsville, York county.

One stack, 50 x 12, built in 1867, rebuilt in 1874; fuel, anthracite coal and coke; ores, from York county and Cornwall; product, neutral gray forge and foundry pig iron; annual capacity, 7,500 net tons. Michael Schall, President; F. J. Magee, Secretary; H. Wilton, Treasurer and Manager.

Bird Coleman, Donaghmore, and North Cornwall Furnaces, W. C. Freeman, General Manager, Cornwall, Lebanon county. Four stacks:

Bird Coleman Furnaces, owned by R. W. Coleman's heirs; No. 1, 75 x 18, built in 1872-3, and rebuilt in 1885; No. 2, 75 x 18, built in 1879-80, and rebuilt in 1885. Donaghmore Furnace, owned by R. W. Coleman's heirs; one stack, 44 x 14, built in 1855. North Cornwall Furnace, owned by Mrs. M. C. Freeman; one stack, 52 x 15, built in 1872-4. Use Cornwall ore exclusively; fuel, coke and anthracite coal; equipped with Whitwell and pipe stoves; specialty, Bessemer pig iron. Selling agents, J. Tatnall Lea & Co., Philadelphia. *See Charcoal Furnaces.*

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

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Company, Jerome L. Boyer, Superintendent, Reading. Works at Columbia, Lancaster county. Two stacks: one, 60 x 15, built in 1854, remodeled in 1881; and one, 45 x 13½, built in 1868, and to be raised to 60 feet and otherwise remodeled in 1886; (a third stack, No. 1, now abandoned, was built in 1845;) fuel, anthracite and coke; ores, Cornwall, Chestnut Hill, Ebbvale (Maryland), and New Jersey; specialty, foundry pig iron; present annual capacity of both furnaces is 30,000 net tons, but after proposed improvements are made it will be 45,000 tons. Brand, "Chestnut Hill." Main office, 52 Wall st., New York; B. G. Clarke, President, and Charles E. Sturges, Treasurer.

Chickies Furnaces, Chickies Iron Company, (successors to E. Haldeman & Co.,) Chickies, Lancaster county. Two stacks: No. 1, 45 x 10½, built in 1845, blown in January 15, 1846; No. 2, 45 x 12, built in 1854, blown in in 1855; fuel, anthracite coal and coke; ores, magnetic from Corn-



wall, Lebanon county, and Chestnut Hill brown hematite from Silver Spring, Lancaster county; product, foundry and mill pig iron. Brand, "Chickies." No. 1 Furnace will be torn down in 1886 and an entirely new stack erected, to be 65 x 12. Paris Haldeman, President; Horace L. Haldeman, Secretary and Treasurer. Selling agents, Justice Cox, Jr., & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; J. Reamer, Pittsburgh; and Stroud & Co., New York.

Colebrook and Cornwall Anthracite Furnaces, Robert H. Coleman, Lebanon, Lebanon county. Four stacks. Colebrook Furnaces, at Lebanon; No. 1, 55 x 14½, completed in November, 1881, has made 626 gross tons of pig iron per week on all Cornwall ore; No. 2, 80 x 14½, completed in November, 1882, has made 848 gross tons of pig iron per week on all Cornwall ore. Cornwall Anthracite Furnaces, at Cornwall, Hugh M. Maxwell, Manager; No. 1, 38 x 12, built in 1854; No. 2, 38 x 13, remodeled in 1885; use Cornwall ore exclusively.

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

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

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

Katherine Furnace, C. W. Abl's Son, Carlisle, Cumberland county. Works at Boiling Springs. One stack, 50 x 11, built in 1881-2; fuel, anthracite and coke; ore, local brown hematite; product, forge pig iron. Brand, "Carlisle."

Lebanon Furnaces, Arthur and Horace Brock, Lebanon, Lebanon county. Two stacks: one, 50 x 13, built in 1846, reconstructed in 1868; the other, 65 x 17, built in 1872-3, put in blast in August, 1873; both stacks remodeled in 1883; one Whitwell fire-brick and one iron hot-blast stove; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron. (A third stack, 36 x 12, built in 1847, was torn down to rebuild, but work on it has been discontinued.) The combined capacity of the two furnaces in operation is about 1,000 net tons a week.

Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867, blown in December 23, 1867; remodeled in 1884; two Whitwell fire-brick hot-blast stoves; fuel, anthracite and coke; ores, principally Cornwall; specialty, gray forge red-short pig iron; annual capacity, 22,000 net tons. Brand, "Lebanon Valley." *See Bloomaries.*

Lochiel Furnace, Lochiel Furnace Company, Harrisburg, Dauphin county. One stack, 65 x 13, first put in blast in April, 1873, and remodeled in 1886; two Whitwell stoves; fuel, coke and anthracite; ore, Cornwall magnetic and local hematite; product, forge pig iron; annual capacity, 24,000 net tons. Brand, "Lochiel." Henry McCormick, President; J. H. Landis, Secretary and Manager.

Marietta Furnaces, George Dawson Coleman, Marietta, Lancaster county. Two stacks: one, 50 x 12½, built in 1847, and remodeled in 1880; and one, 38 x 12, built in 1849; total annual capacity, 12,000 net tons.

Paxton Furnaces, McCormick Estate, Harrisburg, Dauphin county. Two stacks, 52 x 13 and 60 x 14, built in 1855 and 1872, respectively; five Whitwell fire-brick stoves; fuel, anthracite and coke; a variety of ores used; product, mill pig iron; total annual capacity, 40,000 net tons. Brand, "Paxton." *See Rolling Mills.*

Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Five stacks: No. 1, 60 x 14, built in 1872-3, and put in blast in October, 1873, remodeled in 1883, and supplied with two Whitwell stoves. No. 2, 76 x 20, built in 1874-6, put in blast in June, 1876, remodeled in 1877, and supplied with three Whitwell stoves. Nos. 3 and 4, each 70 x 18; No. 3 first put in operation in February, 1884, and No. 4 first put in operation in April, 1884; each has three Whitwell stoves. No. 5, 55 x 11, built in 1873-4, and remodeled in 1882; iron stoves. Fuel, coke and anthracite; ores, foreign and domestic hematite and magnetic; specialty, Bessemer pig iron; total annual capacity, 175,000 net tons. *See Ashland Furnaces in Maryland. See Rolling Mills.*

Richmond Furnace, Southern Pennsylvania Railroad and Iron and Mining Company, Richmond Furnace, Franklin county. Formerly called Mount Pleasant Iron Works. One stack, 36 x 9½, built in 1865, and rebuilt in 1875; open top; fuel, anthracite and coke; ores from the Richmond mines, two miles from the furnace; annual capacity, 5,500 net tons. T. B. Kennedy, Manager, Chambersburg.

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



- Swatara Furnace, Swatara Furnace Company, lessees, Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854, and remodeled in 1880; fuel, anthracite and coke; ores, magnetic, brown hematite, and fossil, from Lebanon, Dauphin, and Juniata counties; product, gray forge pig iron; annual capacity, 8,000 net tons. Brand, "Swatara." Formerly called Union Deposit Furnace. John Q. Denney, President; D. Watts, Secretary and Treasurer.
- Vesta Furnace, Columbia Rolling Mill Company, Columbia. Furnace at Vesta, Lancaster county. Formerly called Musselman Furnace. One stack, 60 x 14, built in 1868, rebuilt in 1881, and remodeled in 1886; fuel, anthracite and coke; ores, hematite and magnetic, from Cumberland and Perry counties; product, neutral forge and foundry iron; annual capacity, 15,000 net tons. Brand, "Vesta." See *Rolling Mills*.
- Wister Furnace, Philadelphia and Reading Railroad Company, 227 South Fourth st., Philadelphia. Furnace at Harrisburg, Dauphin county. One stack, 60 x 14, first blown in February 15, 1868; purchased by this company in 1883 to secure right of way for the South Pennsylvania Railroad Company. Not in blast in 1886.
- Number of furnaces in the Lower Susquehanna region: 37 stacks. A cupola furnace, named Ruby Furnace, has been operated for two years by Albert Ferguson & Co., at Colebrook, Lebanon county, extracting pig iron from slag.

## SHENANGO VALLEY—BITUMINOUS COAL OR COKE.

- Claire Furnace Company Limited, Sharpsville, Mercer county. One stack, 50 x 14, built in 1869; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 22,000 net tons. Rebuilding another stack built in 1869, to be 75 x 15. Formerly called Mount Hickory Furnaces. Branch office with M. A. Hanna & Co., Cleveland, Ohio. M. A. Hanna, Chairman; A. C. Saunders, Treasurer; A. M. Robbins, Secretary and General Manager, all at Cleveland. Josiah Robbins, Superintendent, Sharpsville.
- Douglas Furnaces, Pierce, Kelly & Co., Sharpsville, Mercer county. Two stacks: one stack, 60 x 15, built in 1870, and put in blast in March, 1871, rebuilt and enlarged in 1879; the other stack, 60 x 15, built in 1872, put in blast in February, 1873, and enlarged in 1881; fuel, Connellsville coke; ore, Lake Superior; specialty, pig iron for Bessemer and Siemens-Martin steel; combined annual capacity, 60,000 net tons. Brand, "Douglas."
- Ella and Fannie Furnaces, Wheeler Furnace Company, lessees, Sharon, Mercer county. Two stacks at West Middlesex. Ella Furnace, 70 x 15, built in 1882, occupies the site of the two Shenango Furnaces, which were built in 1859 and torn down in 1882. Fannie Furnace, 60 x 12½, first put in blast October 13, 1873, and remodeled in 1885. Fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity of Ella Furnace, 30,000 net tons, and of Fannie Furnace, 26,000 net tons. Brand, "Wheeler." E. A. Wheeler, Manager.

Pickands, Mather & Co., Cleveland, Ohio, proprietors and selling agents.

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• Etna Furnaces, Etna Iron Works Limited, New Castle, Lawrence county. Two stacks, each 75 x 16, originally built in 1868, one rebuilt in 1882-3, and one rebuilt in 1886; fuel, coke; ore, Lake Superior; specialty, gray forge pig iron; annual capacity, 70,000 net tons. Brand, "Etna." See *Rolling Mills*.

Henderson Furnace, Henderson, Forker & Co., Sharpsville, Mercer county. One stack, 60 x 12, built in 1868, put in operation in October, 1868, remodeled in 1882; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 15,000 net tons. Formerly called Allen Furnace.

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

- Mabel Furnaces, Perkins & Co. Limited, Sharpsville, Mercer county. Two stacks, each 65 x 14; No. 1 built in 1872, and No. 2 in 1880, both rebuilt in 1883; fuel, block coal and coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 30,000 net tons. Brand, "Mabel." S. Perkins, Jr., Chairman and Manager; L. C. Hanna, Secretary and Treasurer. Selling agents, M. A. Hanna & Co., Cleveland.

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• Neshannock Furnace, Crawford Iron and Steel Company, New Castle, Lawrence county. One stack, 78 x 17, built in 1872, first put in operation December 1, 1872, remodeled in 1883; three Whitwell stoves, each 60 x 17; fuel, coke; ore, Lake Superior; product, foundry and mill pig iron; annual capacity, 50,000 net tons. A. L. Crawford, President; William Patterson, Vice-President; John L. Crawford, Secretary; James A. Crawford, Treasurer; W. E. Reis, Manager.

- Raney & Berger, New Castle, Lawrence county. One stack, 60 x 16, built in 1872, put in blast in May, 1872; fuel, coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 40,000 net tons. Brands, "Norway," "Crown," and "Hecla."

- Rosena and Sophia Furnaces, A. B. Berger, Agent, New Castle, Lawrence county. Two stacks: Rosena, 77 x 20, built in 1872, and first put in blast in June, 1873; Sophia, 65 x 16, built in 1872 and rebuilt in 1874; fuel, coke; ore, Lake Superior; product, foundry pig iron; total annual capacity, 50,000 net tons. For sale or to rent.

- Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer county. One stack, 60 x 12, built in 1845, and rebuilt in 1882; fuel, coke; ore, Lake Superior hematite; product, foundry and forge pig iron; annual capacity, 25,000 net tons. Brand, "Sharon." Norman Hall, Manager. Selling agents, Nimick & Co., Pittsburgh.

- Sharon Iron Company, Sharon, Mercer county. Two stacks: one, 48 x 14, built in 1865; and one, 72 x 15, built in 1866, and enlarged in 1883; fuel, raw coal and Connellsville coke; ore, Lake Superior; specialty,
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No. 1 mill pig iron; combined annual capacity, 40,000 net tons. Brand, "Shenango." *See Rolling Mills.*

✓ Sharpville Furnace, Sharpville Furnace Company, Sharpville, Mercer county. One stack, built in 1847, and torn down in 1882; new iron stack, 65 x 13, blown in October 15, 1882; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 30,000 net tons. Brand, "Sharpville." James B. Pierce, Manager.

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

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

-1 Number of furnaces in the Shenango Valley: 23 completed stacks and one stack building.

#### ALLEGHENY COUNTY—COKE.

Carrie Furnace, Carrie Furnace Company, Pittsburgh. Furnace at Rankin Station, Allegheny county. One stack, 80 x 18, removed from Ohio in 1883, blown in February 29, 1884; ore, Lake Superior; product, mill, foundry, and Bessemer pig iron; estimated annual capacity, 50,000 net tons. James S. Brown, President; E. L. Clark, Secretary; H. C. Fownes, Treasurer; W. C. Fownes, Manager.

Clinton Furnace, Graff, Bennett & Co., Pittsburgh. One stack, 45 x 12, built in 1859; ores, principally Lake Superior, and remainder native; annual product, 12,000 net tons. *See Rolling Mills.*

Edgar Thomson Furnaces, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Five completed stacks and two building: Furnace A, 65 x 13, built in 1879, has 3 Siemens-Cowper-Cochrane stoves, each 55 x 15, and one Whitwell stove, 65 x 15. Furnaces B and C, each 80 x 20, built in 1880, have 6 Siemens-Cowper-Cochrane stoves, each 60 x 20, and 2 Whitwell stoves, each 75 x 21. Furnaces D and E, each 85 x 20, built in 1881, have 7 Siemens-Cowper-Cochrane stoves of an improved type. Fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, Missouri, and foreign; product, Bessemer pig iron, spiegeleisen, and ferro-manganese. Furnaces F and G, also 20-foot bosh, now in course of erection, will have an equipment of stoves, etc., practically the same as that of the other large furnaces. Combined annual capacity of the 7 furnaces will be about 450,000 net tons. James Gayley, Superintendent of furnaces. *See Rolling Mills.*

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

Eliza Furnaces, Laughlin & Co. Limited, Pittsburgh. Two stacks, 61 x 16 and 61 x 14, built in 1861, and enlarged in 1873 and 1874; fuel, coke; ore, Lake Superior; specialty, mill pig iron; total annual capacity, 55,000 net tons. Brand, "Eliza." Building a new stack, to be 80 x 20. Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.

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

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

Shoenberger Furnaces, Shoenberger, Speer & Co., Pittsburgh. Two stacks, each 62 x 13½, built in 1865; fuel, coke; ores, Lake Superior, native, and foreign; product, Bessemer, foundry, and gray forge pig iron; combined annual capacity, 45,000 net tons.

Soho Furnace, Moorhead, McCleane & Co., Pittsburgh. One stack, 67 x 18, built in 1872, put in blast November 22, 1872; fuel, coke; ore, Lake Superior; specialty, Bessemer pig iron; annual capacity, 45,000 net tons. Brand, "Soho."

Number of furnaces in Allegheny county: 17 completed stacks, and 3 stacks building.

#### RAW BITUMINOUS COAL OR COKE—MISCELLANEOUS.

Allegheny Furnace, E. Baker's Heirs, Altoona, Blair county. One stack, built in 1811, rebuilt in 1847; fuel, coke; ore, local hematite and fossil; product, mill pig iron; annual capacity, 5,000 net tons. Brand, "Altoona."

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

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

Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Seven stacks. Six are at Johnstown, and one is at East Conemaugh, two miles from Johnstown. Of the stacks at Johnstown, Nos. 1, 2, 3, and 4 were built in 1853 and 1854; Nos. 1 and 2 were rebuilt in 1883, and are each 76 x 16; Nos. 3 and 4 have been rebuilt in 1886, and are each 76 x 16; the fifth, 76 x 19, called Centennial Furnace, was built in 1873-6, and blown in December 22, 1876; the sixth is 76 x 19, and was first blown in July 20, 1879. Fuel, Connellsville and Conemaugh coke; ores, brown hematite from Blair county, Pa., and red hematite from Menominee Range, Michigan. Specialty, Bessemer pig iron. The stack at East Conemaugh is 51 x 11½, was built in 1857, rebuilt in 1883, and is now making spiegeleisen from a mixture of foreign and domestic ores. These furnaces are equipped with sixteen Whitwell fire-brick and nine Player iron stoves. Total annual capacity, 325,000 net tons. The furnaces of the Blair Iron and Coal Company, which are practically under the same management, add 30,000 net tons to this capacity, making the total 355,000 net tons. *See Rolling Mills.*

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

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

Elizabeth Furnace, John Whitehead, Sabbath Rest, Blair county. One stack, 32 x 9, built in 1832; fuel, coke; estimated annual capacity, 3,000 net tons.

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin

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

Everett Iron Company, Everett, Bedford county. One stack, 75 x 20, built in 1883-4, and first blown in December 9, 1884; three Siemens-Cowper-Cochrane hot-blast stoves; fuel, Broad Top coke; ores, local fossil and hematite; annual capacity, 33,000 net tons. Brand, "Everett." Frederick Prime, Jr., Receiver, 222 South Third st., Philadelphia; Superintendent for Receiver, James S. Cunningham.

Fairchance Furnace, Fairchance Furnace Company, Fairchance, Fayette county. One stack, 44 x 12, built in 1794, and rebuilt in 1871; fuel, coke; ores, native carbonates, varying from 30 to 50 per cent.; all stock mined on the property; annual capacity, 10,000 net tons. J. D. Lyon, President; W. H. DeForest, Jr., Secretary and Treasurer, 466 Broome st., New York; R. L. Martin, General Superintendent, Fairchance, Pa.

Frankstown Furnace, James Pierpoint, lessee, Frankstown, Blair county. One stack, 45 x 10, built in 1836, rebuilt in 1872; fuel, coke; ore, Centre county hematite; product, pig iron for Clapp-Griffiths steel process; annual capacity, 6,000 net tons. Main office, Bellefonte, Pa.

Gap Furnace, Hollidaysburg and Gap Iron Company, Hollidaysburg. Furnace at McKee, Blair county. One stack, 46½ x 10, built in 1840, and remodeled in 1877; fuel, coke; annual capacity, 6,000 net tons. James Denniston, President and Treasurer; Aug. S. Landis, Secretary.

Glamorgan Furnaces, Glamorgan Iron Company, 332 Walnut st., Philadelphia. Works at Lewistown, Mifflin county. Two stacks: one, 46 x 13½, built in 1868; one, 72 x 16½, built in 1872, and rebuilt in 1884-5; fuel, coke; ores, native fossil and hematite; product, foundry and gray forge pig iron; annual capacity of No. 1 Furnace, 9,000 net tons; No. 2 Furnace, 25,000 net tons. Brand, "Glamorgan." R. B. Wigton, President; C. B. Wigton, Secretary, Treasurer, and selling agent; Austin Farrell, Superintendent.

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

Lemont Furnace, R. Hogsett & Co., Lemont Furnace P. O., Fayette county. One stack, 55 x 16, built in 1875, first put in blast in January, 1876, and rebuilt in 1885; fuel, coke; ores, native and Lake

- Superior; product, mill pig iron; annual capacity, 15,000 net tons. Brand, "Lemont." Selling agent, W. E. Beall, Pittsburgh.
- Lucy Furnace, Whitehead & Swoope, Mount Union, Huntingdon county. Formerly called Matilda Furnace. One stack,  $42\frac{1}{2} \times 10$ , built in 1837, and rebuilt in 1869; fuel, Latrobe and Connellsville coke; ores, fossil and Juniata Valley hematite; product, gray forge pig iron; annual capacity, 4,000 net tons. John Whitehead, Treasurer; G. W. R. Swoope, Superintendent. Main office, Huntingdon.
- Oliphant Furnace, Fayette Coke and Furnace Company, Oliphant Furnace, Fayette county. Telegraph address, Uniontown or Fairchance. One stack,  $55 \times 12\frac{1}{2}$ , built in 1875-6; fuel, coke; ores, local carbonate, mill cinder, Blair county, and Lake Superior; product, mill pig iron; annual capacity, 12,000 net tons. A. W. Bliss, President and Treasurer, Uniontown; A. B. de Saulles, Superintendent, Oliphant Furnace; A. H. Childs, selling agent, Pittsburgh.
- Pennsylvania Furnace, Centre Mining Company Limited, Pennsylvania Furnace P. O., Huntingdon county. One stack,  $44 \times 12$ , built in 1813; changed from charcoal to coke in 1881; fuel, Connellsville coke; pipe ore from furnace property; product, forge pig iron; annual capacity, 10,000 net tons. C. J. Hillard, Chairman; W. H. Smith, Treasurer and Superintendent. E. M. Valentine, 261 South Fourth st., Philadelphia, sole sales agent.
- Powelton Furnace, Robert Hare Powell's Sons & Co., 419 Walnut st., Philadelphia. Furnace at Saxton, Bedford county. One stack,  $70 \times 18$ , built in 1880-1, and blown in October 16, 1882; fuel, Broad Top coke; ores,  $\frac{1}{2}$  native from the firm's mines and  $\frac{1}{2}$  Lake Superior; three  $70 \times 18$  Whitwell fire-brick stoves; product, No. 1 foundry pig iron; annual capacity, 25,000 net tons. Building a second stack,  $75 \times 16$ , with three  $60 \times 18$  improved Whitwell stoves. Brand, "Powelton." Test of No. 1 pig iron by Baldwin Locomotive Works showed 23,582 pounds tensile strength per square inch and shrinkage of  $\frac{1\frac{1}{2}}{100}$  inch per foot.
- Rebecca Furnace, Kittanning Iron Company Limited, Kittanning, Armstrong county. One stack,  $65 \times 16$ , first put in blast June 20, 1880; fuel, coke; ores, native and Lake Superior; product, forge and foundry pig iron; annual capacity, 25,000 net tons. Brands, "Kittanning" and "Rebecca." See *Rolling Mills*.
- Red Bank Furnace, David & John D. Reynolds, Red Bank Furnace P. O., Clarion county. One stack,  $42 \times 11\frac{1}{2}$ , built in 1859; fuel, coke; limestone ore, mined on the furnace land; specialty, cold-short mill pig iron; annual capacity, 7,800 net tons. David Reynolds, Manager.
- Rockhill Furnaces, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Office, 320 Walnut st., Philadelphia. Two stacks, each  $65 \times 17$ , built in 1875, and blown in January 1, 1876; one stack rebuilt in 1886; fuel, Rockhill coke; ores,  $\frac{1}{2}$  soft fossil and  $\frac{1}{2}$  hematite from the company's mines and from Spruce Creek, Bellefonte, and Virginia; specialty, gray forge pig iron; total annual capacity, 30,-



000 net tons. Brand, "Rockhill." William A. Ingham, President; Edward Roberts, Jr., Vice-President; William Boyd Jacobs, Secretary and Treasurer; Alfred W. Sims, Manager.

Number of raw coal or coke furnaces outside of Allegheny county and the Shenango region : 32 completed stacks and one stack building.

#### CHARCOAL.

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

Carlisle Iron Works, C. W. & D. V. Ahl, Carlisle. Works at Boiling Springs, Cumberland county. One stack, 28 x 8½, built in 1798, and rebuilt in 1815; hot blast; water-power; ore, Cumberland county hematite; specialties, neutral forge pig iron and car-wheel iron; annual capacity, 5,000 net tons. Brand, "Carlisle." *See Bloomaries.*

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

Chestnut Grove Furnace, John C. Long, Mechanicsburg. Furnace at Idaville, Adams county. One stack, 32 x 8½, built in 1830; cold blast; open top; ores, hematite and magnetic; product, car-wheel pig iron; annual capacity, 1,600 net tons.

Cleversburg Furnace, Richard Blickenderfer, 128 North Water st., Lancaster. Furnace at Shippensburg, Cumberland county. One stack, 35 x 8, built in 1881, and remodeled in 1882; cold blast; ores, local limestone and hematite; product, car-wheel pig iron; daily capacity, 6 tons. Not in blast in 1886.

Cornwall Charcoal Furnace, R. W. Coleman's Heirs, Cornwall, Lebanon county. One stack, 31 x 8, built in 1742; cold blast. W. C. Freeman, General Manager. *See Lower Susquehanna Furnaces.*

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

East Penn Furnace, John Balliet, Bowmanstown, Carbon county. One stack, 28 x 7½, built in 1837; cold blast; water-power.

Falling Spring Furnace, C. Burkhart & Co., Chambersburg, Franklin county. One stack, 40 x 8½, built in 1880, and remodeled in 1883-4; cold or hot blast; ore, local hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Falling Spring." Furnace out of blast in 1886. For sale or rent.



Greenwood Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Works at Greenwood, Huntingdon county. Philadelphia office, 218 South Fourth st. One stack, 32 x 9, built in 1864; open top; cold blast; red fossiliferous ore, obtained in the vicinity; pig iron used for car-wheels and chilled rolls; annual capacity, 2,700 net tons. (One stack, built in 1833, not used since 1882.) *See Emma (coke) Furnace. See Rolling Mills.*

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

Hope Furnace, Joseph L. Brown & Co., Pittsburgh. Furnace at Rose Point, Lawrence county. One stack, 28 x 8, built in 1868; cold blast. Not in blast in 1886.

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

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

Isabella Furnace, Joseph D. Potts, Barneston, Chester county. Telegraph address, Barneston, *via* Glenmoore. Philadelphia office, 234 South Fourth st. One stack, 35 x 7½, built in 1835, and rebuilt in 1864 and 1881; cold blast; product, car-wheel pig iron, made from magnetic and hematite ores, mined in Lancaster and Chester counties, with a mixture of Spanish ore; annual capacity, 5,000 net tons. Brand, "Wyebrooke." William M. Potts, Manager. Selling agents, L. & R. Wister & Co., 257 South Fourth st., Philadelphia.

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

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

Logan Furnace, Bellefonte, Centre county. One stack, 32 x 8, built in 1806, and rebuilt 3 miles from original site in 1843; open top; cold

blast; water-power; ore, strictly neutral brown hematite; specialty, car-wheel pig iron; annual capacity, 4,000 net tons. Now owned by a syndicate, which includes Samuel Dickson and B. K. Jamison, of Philadelphia, and other Pennsylvania capitalists. *See Rolling Mills. See Bloomaries.*

Maiden Creek Furnace, Jacob K. Spang, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold blast; open top; ores, Moselem hematite and local magnetic; product, pig iron for car-wheels and chilled rolls; annual capacity, 2,500 net tons. Brand, "Maiden Creek."

Mont Alto Furnace, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph connection with Western Union office at Chambersburg. One stack, 45 x 9½, built in 1807-8, and height increased in 1881; cold and warm blast; ore, exclusively neutral brown hematite, from the furnace property; product, pig iron for car-wheels, chilled rolls, and blooms; annual capacity, 10,000 net tons. Brand, "Mont Alto." George B. Wiestling, Superintendent. *See Bloomaries.*

Niagara Furnace, Haines, Stephenson & Co., Mill Hall, Clinton county. One stack, 32 x 10, built in 1830, abandoned in 1857, and revived in 1880; run for a short time on coke, and then changed to charcoal. Formerly called Mill Hall Furnace.

Oley Furnace, Clymer Iron Company, Temple, Berks county. Furnace in Oley township. One stack, 30 x 8, built in 1772; open top; cold blast; steam and water power; ores, ¾ hematite and ¼ primitive; specialty, No. 1 dead gray iron; annual capacity, 2,000 net tons. *See Schuylkill Valley Furnaces.*

Pine Grove Furnace, South Mountain Mining and Iron Company, Pine Grove Furnace P. O., Cumberland county. One stack, 53 x 9, built in 1770, remodeled in 1877 and 1883; hot blast; ore, hematite, procured on the furnace property; product, forge pig iron, for flange and fire-box iron; annual capacity, 6,000 net tons. J. C. Fuller, President; W. H. Woodward, Treasurer; Daniel King, Superintendent. *See Bloomaries.*

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

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

Number of charcoal furnaces in Pennsylvania: 24 completed stacks, and one unfinished stack. Total number of furnaces in Pennsylvania: 244 completed stacks, and 6 stacks building.

#### PROJECTED.

A large coke stack is projected near Bellefonte, Centre county, by the syndicate now owning the Valentine iron ore banks.

The Cameron Coal Company proposes to erect a coke furnace on its property in Cameron county.

## MARYLAND.

### MIXED ANTHRACITE AND COKE.

Ashland Furnaces, Pennsylvania Steel Company, lessees, Steelton, Pa. Furnaces at 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; Nos. 1 and 2 are blown by steam and water power, No. 3 by steam; fuel, anthracite and coke; ores, foreign, from Spain, Africa, and Cuba; product, Bessemer pig iron; total annual capacity, 25,000 net tons. Walter S. Franklin, Manager, and Secretary of Ashland Iron Company, owners of the furnaces. *See Pennsylvania Steel Company, Pennsylvania. See Rolling Mills in Pennsylvania.*

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

Number of anthracite furnaces in Maryland: 4 stacks.

### COKE.

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

Catoctin Iron Company, Catoctin Furnace P. O., Frederick county. One stack, 50 x 11½, built in 1873-4; fuel, Connellsville coke; ore, local hematite; product, mill and foundry pig iron; annual capacity, 9,000 net tons. Brand, "Catoctin." John Kunkel, President; John K. Wilson, Vice-President; Charles E. Kunkel, Secretary; Steiner Schley, Treasurer; William P. Kunkel, General Manager. Selling agents, E. L. Harper & Co., Cincinnati. *See Charcoal Furnaces.*

Number of coke furnaces in Maryland: 2 stacks.

### CHARCOAL.

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

Cedar Point Charcoal Furnace, Baltimore Iron Company, Baltimore, Baltimore county. One stack, 40 x 9½, built in 1843; hot blast; closed

- top; ore, exclusively from Baltimore county, most of it being a carbonate; charcoal made in retorts; product, car-wheel and malleable pig iron; annual capacity, 4,500 net tons. *See Anthracite Furnaces.*
- Chesapeake Furnace, D. M. Reese & Sons, Locust Point, Baltimore. Works at Canton, Baltimore. One stack, 32 x 8½, built in 1846, and remodeled in 1882; warm blast; ore, Baltimore carbonate; specialty, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Chesapeake." (Another stack, 32 x 8, built in 1853, dismantled in 1883.) W. E. McAbee, Manager; Edward S. Reese, Treasurer. Selling agents, R. C. Hoffman & Co., 23 South Frederick st., Baltimore. *See Laurel Furnace.*
- Green Spring Furnace, J. B. Haines & Co., Green Spring Furnace, Washington county. Telegraph address, Clear Spring. One stack, 35 x 8½, built in 1848, rebuilt in 1865; warm blast; water-power; open top; ore, red and brown hematite, mined one mile from furnace, yielding 55 per cent.; specialty, gray pig iron; annual capacity, 1,200 net tons. Works for sale.
- Laurel Furnace, D. M. Reese & Sons, Locust Point, Baltimore. One stack, 50 x 9, built in 1846, and rebuilt in 1856, 1873, and 1882; warm blast; ore, Baltimore carbonate; product, car-wheel pig iron; annual capacity, 5,600 net tons. Brand, "Laurel." D. W. Reese, Superintendent; Edward S. Reese, Treasurer. Selling agents, R. C. Hoffman & Co., 23 South Frederick st., Baltimore. *See Chesapeake Furnace.*
- Locust Grove Furnace, Furstenburg & Adler, Rossville, Baltimore county. One stack, 30 x 7½, built in 1849; hot blast; open top; ore mined at the furnace; product, car-wheel and malleable pig iron; annual capacity, 2,600 net tons. Brand, "Locust Grove."
- Maryland Furnaces, H. W. Ellicott & Son, Jackson & West sts., Baltimore. Two stacks, 50 x 10 and 50 x 9, built in 1853 and 1870, and rebuilt in 1872 and 1873; moderately warm blast; argillaceous ore, mined near Baltimore; specialty, car-wheel and malleable pig iron; total annual capacity, 12,000 net tons. Brand, "Maryland." H. W. Ellicott, Jr., Manager.
- Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George's county. Telegraph address, Laurel. One stack, 29 x 8½, built in 1847; open top; ores, carbonates, mined in neighborhood, roasted and crushed before using; pig iron used for car-wheels, guns, flange iron, shot and shell; annual capacity, 4,200 net tons. Brand, "Muirkirk." Selling agents, Robinson & Orr, Pittsburgh; William E. Coffin & Co., Boston; and Stroud & Co., New York.
- Principio Furnace, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Perryville. One stack, 35 x 9, built in 1723, and rebuilt in 1836; warm blast; water-power; ores, equal proportions of Baltimore bone and Iron Hill (Delaware) magnetic, brought from mines belonging to same owners in Baltimore county, Maryland, and Newcastle county, Delaware; specialty, car-wheel pig iron. Brand, "Principio." *See Bloomaries.*

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

Number of charcoal furnaces in Maryland: 13 stacks. Total number of furnaces in Maryland: 19 stacks.

## VIRGINIA.

## COKE.

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

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

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

Longdale Iron Company, Longdale, Alleghany county. Two stacks: one stack, (Lucy Selina,) 60 x 11, built in 1827, rebuilt in 1873, and raised to 60 feet in 1876; the other stack, 60 x 14, first put in blast in February, 1881; fuel, West Virginia coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 29,000 net tons. Brand, "Longdale." F. A. Comly, President, Philadelphia; H. Firmstone, General Superintendent; J. E. Johnson, Manager. E. L. Harper & Co., Cincinnati, Western sales agents.

Low Moor Furnace, Low Moor Iron Company of Virginia, Low Moor, Alleghany county. One stack, 74 x 18, built in 1880; four Whitwell fire-brick hot-blast stoves; fuel, New River coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 40,000 net tons.

John Means, President; H. M. Bell, Vice-President; John F. Winslow, Chairman Executive Committee; E. A. Low, Treasurer, and A. Aug. Low, Assistant Treasurer, 31 Burling Slip, New York; H. W. Goodwin, General Manager. Western sales agent, Thomas A. Mack, Cincinnati.

Lynchburg Furnace, Lynchburg Iron Company, 220 South Third st., Philadelphia. Furnace at Lynchburg, Campbell county. One stack, 60 x 11½, first put in blast in December, 1880, remodeled in 1882, and again in 1884; fuel, New River coke; ores, local brown hematite and magnetic; annual capacity, 14,000 net tons. E. Burd Grubb, President; Alexander Van Rensselaer, Vice-President.

Powhatan Furnace, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Furnace in Henrico county, on Richmond and Alleghany Railroad, 5 miles above Richmond. One stack, 50 x 13½, built in 1860, and rebuilt in 1872-3; open top; water-power; annual capacity, 9,000 net tons. Formerly called Westham Furnace. *See Schuylkill Valley (Pa.) Furnaces. See Rolling Mills.*

Princess Furnace, D. S. Cook, Glen Wilton, Botetourt county. Main office, Wrightsville, Pa. One stack, 60 x 12½, built at Ashland, Boyd county, Kentucky, and first put in operation in May, 1877; removed to Virginia in 1883-4; three Whitwell fire-brick hot-blast stoves; fuel, New River coke; ores, hematites and manganese, mined on the furnace property; product, soft, strong, and very fluid foundry pig iron; annual capacity, 13,000 net tons. Brand, "Princess." T. D. Kauffelt, Manager. Selling agents, Reed, Stickney & Co., Baltimore.

Victoria Furnace, L. M. Shute, P. O. Box 1,261, Philadelphia. Furnace at Goshen Bridge, Rockbridge county. One stack, 85 x 20, built in 1882-3, and first put in blast May 1, 1883; three 60 x 25 Siemens-Cowper-Cochrane fire-brick hot-blast stoves; fuel, New River coke; ore, limonite, mined near the furnace; product, neutral foundry and forge pig iron; annual capacity, 50,000 net tons. Brand, "Victoria." Building another stack of the same size.

Number of coke furnaces in Virginia: 10 completed stacks, and one stack building.

#### CHARCOAL.

Amherst Furnace, operated by the executors of the estate of S. F. Jordan, Snowden, Amherst county. Telegraph address, Balcony Falls. One stack, 33 x 9, built in 1863; warm blast; water-power; ore, brown hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. John T. Jordan, Manager. Selling agents, R. C. Hoffman & Co., Baltimore, and E. L. Harper & Co., Cincinnati.

Cave Hill Furnace, Robert Sayers, McTeer, Wythe county. One stack, 47 x 10, built in 1881-2; open top; cold blast; ores, red and brown hematite and magnetic, mined near the furnace; product, car-wheel pig iron; daily capacity, 10 net tons.

Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe

- county. One stack, 32 x 9, built in 1832; cold blast; water-power; ore mined on the furnace property; specialty, car-wheel pig iron; daily capacity, 6 net tons. Selling agents, R. C. Hoffman & Co., Baltimore. J. W. Robinson, part owner and General Manager. *See Bloomaries.*
- Columbia-Liberty Iron Company, Columbia Furnace P. O., Shenandoah county. Telegraph address, Edinburg. Philadelphia office, 216 South Fourth st. Two stacks in Shenandoah county: Columbia Furnace, at Columbia Furnace P. O., 32 x 10, built in 1809, and rebuilt in 1829. Liberty Furnace, at Liberty Furnace P. O., 30 x 9½, built in 1821. Both furnaces are operated with cold blast; ore, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 4,000 net tons. Brand, "Liberty." Samuel G. Merrick, President, Philadelphia; Samuel Knox, Vice-President, 19 Liberty st., New York; Charles H. Krumbhaar, Treasurer, Philadelphia; W. D. Pollard, Secretary, Columbia Furnace; J. B. Gifford, Superintendent.
- Crockett & Co., Crockett Depot, Wythe county. Four stacks in Wythe county: Beverly Furnace, 33 x 9, built in 1880; Eagle Furnace, 34 x 9, built in 1863, rebuilt in 1881; Raven Cliff Furnace, 29 x 9, built in 1810, and rebuilt in 1876; Speedwell Furnace, 32 x 9, built in 1873-4; all cold blast; water-power; open tops; ore, native red and brown hematite; product, car-wheel pig iron; total annual capacity, 7,500 net tons. Brands, the names of the furnaces. J. W. Robinson, Graham's Forge, part owner and General Agent. Selling agents, R. C. Hoffman & Co., Baltimore. *See Bloomaries.*
- Elizabeth Furnace, H. A. Long, lessee, Water Lick, Shenandoah county. Telegraph address, Front Royal. One stack, 35 x 8½, built in 1843, and rebuilt in 1883; hot blast; open top; ore, local fossil; product, forge pig iron; annual capacity, 6,000 net tons. Brand, "Elizabeth." Formerly called Locust Grove Furnace.
- Glenwood Furnace, F. T. Anderson, Glenwood, Rockbridge county. One stack, 35 x 8½, rebuilt in 1874; open top; warm blast; water-power; ores, brown hematite, specular, and magnetic, mined near the furnace; product, car-wheel pig iron; annual capacity, 2,000 net tons. F. T. Anderson, Jr., Superintendent.
- Irontale Furnace, Slaughter, Dunn & Walker, Crockett Depot, Wythe county. Main office, Wytheville. One stack, 41 x 13, built in 1880, and blown in March 1, 1882; cold blast; ore, local red and brown hematite; product, No. 2 foundry pig iron; daily capacity, 15 net tons. Brand, "The Norma Iron Co." John F. Slaughter, President; George R. Dunn, Secretary and Treasurer.
- Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. One stack, 42 x 12, built in 1881-2, and first put in blast in March, 1882; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 8,000 net tons. Main office, 49 Cliff st., New York. Joshua Hendricks, President; Jordan L. Mott, Vice-President; J. T. Pearson, Secretary and Treasurer; W. C. Van Doren, Superintendent and Agent, at the works.



- Lobdell Car-wheel Company, Wilmington, Delaware. Three stacks: Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built from 1870 to 1874, and rebuilt in 1882. Walton Furnace, at Max Meadows, Wythe county, 33 x 8½, built in 1872. White Rock Furnace, in Smythe county, 5 miles from Rural Retreat Station, Wythe county, 38 x 8½, built in 1875, and blown in August 9, 1875. All use cold blast; ore, local brown hematite; total annual capacity, 6,000 net tons. George G. Lobdell, President; William W. Lobdell, Vice-President; George G. Lobdell, Jr., Secretary; P. N. Brennan, Treasurer; J. H. Wissler, Superintendent.
- Pierce Furnace, Foster's Falls Iron and Manufacturing Company, Foster's Falls, Wythe county. One stack, 35 x 8, built in 1881; open top; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Pierce." J. W. Robinson, President and Secretary; R. C. Hoffman, Treasurer; J. J. Baker, Manager. Formerly called New River Furnace.
- Radford Furnace, Radford Iron Company, Radford Furnace P. O., Pulaski county. One stack, 35 x 10, built in 1868; warm blast; product, car-wheel pig iron for the Car-wheel Iron Company. Richard Wood, President, 400 Chestnut st., Philadelphia.
- Reed Island Furnace, Reed Island Iron Company, Reed Island, Wythe county. Furnace in Pulaski county. Main office, Graham's Forge. One stack, 33 x 9, first put in blast April 28, 1881; cold blast; open top; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Owners, J. W. Robinson, D. P. Graham, J. W. McGavock, and R. C. Hoffman & Co. W. R. Tipton, Superintendent.
- Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace, Botetourt county. New York office, 45 Exchange Place. One stack, 32 x 10, built in 1869; hot and cold blast; open top; water-power; ore, hematite, mined on the furnace property; product, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Virginia Salisbury." Eugene Kelly, President and Treasurer; W. Plunket, Secretary; H. S. Dakin, Superintendent. Selling agents, A. Pluemer & Co., Cincinnati, Ohio.
- Sinking Creek Iron Works, J. Willcox Brown, Newport, Giles county. Telegraph address, Christiansburg Depot. One stack, 35 x 9½, built in 1873; warm blast; water-power. E. P. Williams, Superintendent.
- Van Buren Furnace, Dr. Frank King, Van Buren Furnace, Shenandoah county. Telegraph address, Woodstock. One stack, 37½ x 9, built in 1850, rebuilt in 1870; cold blast, but arranged for hot; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. Brand, "King."
- Wythe Furnace, Crockett, Oglesby & Co., Graham's Forge. Furnace on Cripple creek, Wythe county. One stack, 25 x 8, built in 1819, and rebuilt in 1873; open top; cold blast; ore, local red and brown hematite; product, car-wheel pig iron; annual capacity, 1,500 net tons. J.



W. Robinson, Graham's Forge, part owner and General Agent. Selling agents, R. C. Hoffman & Co., Baltimore.

Number of charcoal furnaces in Virginia: 23 stacks. Total number of furnaces in Virginia: 33 completed stacks, and one stack building.

## NORTH CAROLINA.

### CHARCOAL.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 237 South Third st. One stack, 50 x 10, built in 1883-4, and first put in blast April 16, 1884; water-power; hot and cold blast; ore, magnetic, mined on the property; annual capacity, 6,000 net tons. Brand, "Cranberry." A. Pardee, Jr., President; J. S. Wise, Secretary and Treasurer; C. H. Nimson, General Manager.

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

Number of furnaces in North Carolina: 2 charcoal stacks.

## GEORGIA.

### COKE.

Cherokee Iron Works, Cherokee Iron Company, Cedartown, Polk county. One stack, 60 x 13, built in 1874-5, and first blown in March 22, 1877, on charcoal; rebuilt and changed to coke in 1885; fuel, Coosa coke; ore, brown hematite, mined near the works; annual capacity, 20,000 net tons. Brand, "Cherokee." A. G. West, President and Superintendent; J. Hull Browning, of New York, Treasurer; J. R. Barber, Secretary; Edward Doud, Manager. Selling agents, Rogers, Brown & Co., Cincinnati and St. Louis.

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

Number of coke furnaces in Georgia: 2 stacks.

### CHARCOAL.

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

Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located eight miles north of Rome, on Selma Division of

East Tennessee, Virginia, and Georgia Railroad. One stack, 60 x 10, built in 1874; product, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Hermitage." Edward Nichols, President and General Manager.

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

## ALABAMA.

### COKE.

Alice Furnaces, Alice Furnace Company, Birmingham, Jefferson county.

Two stacks: No. 1, 63 x 15, built in 1879-80, and put in blast November 23, 1880; three 48-pipe iron hot-blast stoves, to be replaced with fire-brick stoves very soon. No. 2, 75 x 18, built in 1883, and put in blast July 24, 1883; three Whitwell fire-brick hot-blast stoves. Ores, brown and red hematite and limonite, from the company's mines; specialties, best grade of coke foundry and mill pig iron; total annual capacity, 60,000 net tons. Brand, "Alice." T. T. Hillman, President and General Manager; J. A. Stratton, Secretary and Treasurer; J. J. Gray, Special Agent, Room 13, Johnston Building, Cincinnati, Ohio. Selling agents, R. L. Coleman & Co., St. Louis; Minnigerode & Co., New Orleans; Justice Cox, Jr., & Co., Philadelphia.

Bibb Furnace, Brierfield Iron and Coal Company, Brierfield, Bibb county. One stack, 50 x 10½, built in 1864 to use charcoal, rebuilt in 1881, and remodeled to use coke in 1886; ore, brown hematite, mined in the immediate vicinity; annual capacity, 14,000 net tons. *See Rolling Mills.*

DeBardeleben Coal and Iron Company, Birmingham. Building two stacks at Jonesboro', near Birmingham. H. F. DeBardeleben, President.

Edwards Iron Company, Woodstock, Bibb county. One stack, 55 x 12, first blown in June 10, 1880; ore, local brown hematite; product, foundry and mill pig iron; annual capacity, 11,000 net tons. Giles Edwards, President; T. J. Edwards, Superintendent. Selling agents, Rogers, Brown & Co., Cincinnati, and Millard & Combs, St. Louis.

Eureka Company, Oxmoor, Jefferson county. Two stacks: No. 1, 60 x 16, completed in July, 1877; No. 2, 65 x 17, first blown in in March, 1876, and rebuilt and blown in in May, 1886; fuel, coke; ore, red fossiliferous; total annual capacity, 60,000 net tons. D. J. Fallis, President; J. T. Fallis, Secretary and Treasurer, Cincinnati, Ohio.

Mary Pratt Furnace, Mary Pratt Furnace Company, Birmingham, Jefferson county. One stack, 55 x 12, built in 1882, and first put in blast in April, 1883; 3 Whitwell hot-blast stoves; hot or cold blast; fuel, either charcoal or coke, according to the requirements of the iron market; ore, brown and red fossiliferous, mined within 8 miles of the furnace; annual capacity, 15,000 net tons. Brand, "Mary Pratt." H. F. De Bardeleben, President; W. T. Underwood, Secretary, Treasurer, and General Manager; J. H. Edwards, Superintendent.

Pioneer Mining and Manufacturing Company, Birmingham. Building one stack, 75 x 17; fuel, coke. Samuel Thomas, President, and Henry Davis, Secretary, Catasauqua, Pa.

Pratt Coal and Iron Company, Pratt Mines P. O., Jefferson county. Building one stack, 80 x 21; the complete plant as projected will consist of 4 stacks, equipped with fire-brick stoves and all the latest improvements. Enoch Ensley, President.

Sheffield Furnace Company, Sheffield, Colbert county. Building one stack, 75 x 17; three Whitwell fire-brick stoves, each 50 x 18. Horace Ware, President, Birmingham; O. O. Nelson, Vice-President, Montgomery; Henry C. Moses, Secretary and Treasurer, Montgomery.

Sloss Furnaces, Sloss Furnace Company, Birmingham, Jefferson county. Two stacks: No. 1, 65 x 16½, built in 1881-2, and put in blast April 12, 1882; No. 2, 75 x 16½, built in 1882; six Whitwell hot-blast stoves; ores mined on the company's property in Central Alabama; product, foundry and mill pig iron; annual capacity, 60,000 net tons. Officers at the works: J. W. Sloss, President; Fred. Sloss, Secretary and Treasurer; Mac. Sloss, Superintendent. B. F. Guthrie, Louisville, Ky., Vice-President and General Sales Agent.

Williamson Iron Company, Birmingham. Building one stack, 65 x 13½; fuel, coke; ores, red fossil and brown hematite; product to be foundry pig iron; estimated annual capacity, 15,000 net tons. Brand, "Williamson." C. P. Williamson, President; J. B. Simpson, Secretary.

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

Number of coke furnaces in Alabama: 11 completed stacks, and 6 stacks building.

#### CHARCOAL.

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

Coosa Furnace, Gadsden Iron Company, Gadsden, Etowah county. One stack, 62 x 11, built in 1882 with material formerly composing the Vigo

Iron Company's No. 1 furnace at Terre Haute, Indiana; first blown in May 30, 1883; hot blast; ore, local hard and soft red hematite; product, foundry and mill pig iron; annual capacity, 7,200 net tons. Brand, "Coosa." A. J. Crawford, President, Terre Haute, Indiana; E. G. Eaton, Secretary; R. P. Gobin, Treasurer and Superintendent. Selling agents, George H. Hull & Co., Louisville.

Rock Run Furnace, Bass Furnace Company, Rock Run, Cherokee county. One stack, 47 x 9, built in 1873-4, and enlarged in 1881; hot blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 7,000 net tons. Brand, "Rock Run." J. H. Bass, President, Fort Wayne, Indiana; A. D. Guild, Secretary, Fort Wayne; J. I. White, Treasurer, Fort Wayne; Frank Fitch, Manager.

Round Mountain Iron Works, Round Mountain Iron and Coal Company, W. C. Sibley, President, Augusta, Georgia. Furnace at Round Mountain, Cherokee county, Ala. One stack, 45 x 8½, built in 1853, rebuilt in 1874; cold blast; ore, red fossiliferous; specialty, car-wheel pig iron; annual capacity, 2,500 net tons. Brand, "Round Mountain."

Shelby Furnaces, Shelby Iron Company, Shelby Iron Works P. O., Shelby county. Telegraph address, Columbiana. Two stacks, 56 x 12 and 60 x 14, built in 1863 and 1873, respectively; warm blast; ore, brown hematite, obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Shelby." Newton Case, President and Treasurer, Hartford, Conn.; H. R. Stoughton, General Manager; O. D. Case, Secretary. Selling agent, Moses Lyman, 13 Johnston Building, Cincinnati.

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

Woodstock Furnaces, Woodstock Iron and Steel Company, Anniston, Calhoun county. Two stacks, each 50 x 12; No. 1 first blown in April 13, 1873, rebuilt in 1880; No. 2 first blown in August 27, 1879; hot and cold blast; ore, local brown hematite; product, car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Woodstock." Alfred L. Tyler, President; Sidney F. Tyler, Vice-President, Philadelphia; Samuel Noble, Secretary and Treasurer; C. M. Noble, Manager. Selling agents, Matthew Addy & Co., Cincinnati and St. Louis; George H. Hull & Co., Louisville; C. L. Peirson & Co., Boston.

Number of charcoal furnaces in Alabama: 10 stacks. Total number of furnaces in Alabama: 21 completed stacks, and 6 stacks building.

PROJECTED.

At Sheffield, a coke furnace, by Enoch Ensley and associates.

At Talladega, coke furnaces, by Talladega Alabama Iron Company.

## TEXAS.

## CHARCOAL.

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

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

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

## WEST VIRGINIA.

## BITUMINOUS COAL OR COKE.

Belmont Furnace, Belmont Nail Company, Wheeling, Ohio county. One stack, 60 x 16, first blown in September 4, 1875; fuel, Connellsville coke; ores, Lake Superior; specialty, Bessemer pig iron; annual capacity, 18,000 net tons. Brand, "Belmont." *See Rolling Mills.*

Bettie Furnace, Black Band Iron and Coal Company, Charleston, Kanawha county. Furnace located at Spring Hill station, 4 miles below Charleston. One stack, 50 x 10½, built in 1882-3; fuel, raw bituminous coal; ores, local blackband, block, and limonite; daily capacity, 30 net tons. John Wooldedge, President; F. A. Dearborn, Secretary; William S. Denny, Treasurer; C. K. McDermott, Manager.

Irondale Furnace, F. Nemetz, Independence, Preston county. Telegraph address, Newburg, W. Va. New York office, 99 Water st. One stack, 60 x 13½, built in 1861, and rebuilt in 1886; fuel, coke, manufactured from coal mined on the property; ores, a mixture of half and half limonite and hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 13,000 net tons. Brand, "F. N." A. C. Holy, Manager.

Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1874; fuel, coke; ore, Virginia brown hematite; product, principally foundry pig iron; annual capacity, 12,000 net tons. Brand, "Quinnimont." F. A. Comly, President, and C. Gilpin, Jr., Secretary and Treasurer, Philadelphia; S. B. Patterson, Manager,

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

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

Number of bituminous furnaces in West Virginia: 6 stacks.

#### CHARCOAL.

Bloomery Furnace, Bloomery Furnace Company, Bloomery P. O., Hampshire county. One stack, 40 x 9, built in 1844, rebuilt in 1880; cold blast; product, car-wheel and mill pig iron; weekly capacity, 60 net tons. Property for sale. Inquire of John Birkinbine, 144 South Fourth st., Philadelphia.

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

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

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

### KENTUCKY.

#### BITUMINOUS COAL OR COKE.

Ashland Furnace, Ashland Coal and Iron Railway Company, Douglas Putnam, Jr., General Superintendent, Ashland, Boyd county. One stack, 62 x 16, first blown in August 31, 1869; four Whitwell hot-blast stoves, each 52 x 16, added in 1877; fuel, raw coal; ores, from Bath county; specialty, American Scotch pig iron; annual capacity, 20,000 net tons. Brand, "Ashland." John Means, President; John G. Peebles, Vice-President; Robert Peebles, Secretary and Treasurer.

Licking Furnace, Swift's Iron and Steel Works, 26 West Third st., Cincinnati. Works at Newport, Campbell county, Ky. One stack, 65 x 16, built in 1859, enlarged in 1869; fuel, Connellsville coke; annual capacity, 17,000 net tons. Sales agents, E. L. Harper & Co., Cincinnati. See *Rolling Mills*.

Norton Iron Works, Ashland, Boyd county. One stack, 66 x 16, built in 1873, blown in February 16, 1874, remodeled in 1877; four Whitwell

hot-blast stoves, each 50 x 16; ores, native; fuel, raw coal; product, soft pig iron; annual capacity, 20,000 net tons. Brand, "Norton." Selling agents, Rogers, Brown & Co., Cincinnati. *See Rolling Mills.*  
 Number of bituminous furnaces in Kentucky: 3 stacks.

## 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.

Estill Furnace, C. W. Russell, lessee, Red River Iron Works P. O., Estill county. One stack, 32 x 10, built in 1830; cold blast; open top; ore, native red hematite; specialty, "Red River" car-wheel pig iron; annual capacity, 3,000 net tons. (The above furnace is owned by the Central Kentucky Land, Mining, Manufacturing, and Transportation Company, of Clay City, which also owns the Fitchburg Furnaces in Estill county, not now in use.)

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

Number of charcoal furnaces in Kentucky: 3 stacks. Total number of furnaces in Kentucky: 6 stacks.

## TENNESSEE.

## BITUMINOUS COAL OR COKE.

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

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

Dayton Coal and Iron Company Limited, Dayton, Rhea county. Two stacks, each 75 x 20, completed in 1885; fuel, coke; six Whitwell fire-brick stoves; ores, Tennessee fossil and Georgia hematite; product, foundry pig iron; total annual capacity, 80,000 net tons. Brand,



"Dayton." George Jamme, General Manager. Sales office established by the company at Cincinnati. Main office, Saltaire, England; Charles Stead, Chairman, and Titus Salt, Secretary and Treasurer.

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

Tennessee Coal, Iron, and Railroad Company, Nashville. Three stacks: Sewanee A Furnace and South Pittsburg Furnaces, No. 1 and No. 2. The Sewanee A Furnace, at Cowan, Franklin county, is 65 x 15, first put in blast in June, 1880; three Whitwell stoves. Brand, "Sewanee." The South Pittsburg Furnaces were built by the Southern States Coal, Iron, and Land Company Limited, at South Pittsburg, Marion county; No. 1, 70 x 18, first blown in May 2, 1879; No. 2, 70 x 18, completed in 1881; seven Whitwell hot-blast stoves; product, foundry pig iron. Brand, "South Pittsburg." Fuel, coke, made in the company's ovens at Tracy City; ore, chiefly hard red fossiliferous, from the Inman mines of the company near South Pittsburg; annual capacity of Sewanee A Furnace, 30,000 net tons; South Pittsburg Furnaces, 80,000 net tons. Another stack will be built at South Pittsburg. N. Baxter, Jr., President; T. M. Steger, Vice-President; James Bowron, General Manager; C. Flisher, Secretary; Leslie Warner, Treasurer, all at Nashville. J. Lodge, Superintendent South Pittsburg Division; A. Short, Superintendent Cowan Division; E. O. Nathurst, Superintendent Tracy City Division. Selling agents, Rogers, Brown & Co., Cincinnati; Coleman & Bro., St. Louis; George H. Hull & Co., Louisville.

Number of bituminous coal or coke furnaces in Tennessee: 9 stacks.

## CHARCOAL.

Aetna Furnace, Aetna Iron Company, Nashville. Works at Aetna, Hickman county, building in 1886; one stack, 55 x 11; hot or cold blast; two Whitwell fire-brick stoves; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 net tons. Brand, "Aetna." James C. Warner, President; G. M. Fogg, Vice-President; Leslie Warner, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati.

Bear Spring Furnace, Cumberland Iron Works Company, Nashville. Works in Stewart county. One stack, 38 x 11½, built in 1832, abandoned in 1854, and rebuilt in 1873; open top; cold blast; ore, native brown hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Dover." (Dover Furnace, 5 miles from Bear Spring Furnace, has been idle for many years.) J. P. Drouillard, President; Joseph Vaulx, Vice-President; Albert W. Harris, Secretary and Treasurer.

Butler Furnace, R. R. Butler, Mountain City, Johnson county. One stack, 30 x 8, built in 1881, and first blown in in October, 1881; cold



blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Butler." Not in blast in 1886.

Cumberland Furnace, Drouillard Iron Company, Nashville. Works at Cumberland Furnace P. O., Dickson county. One stack, 37 x 9½, built in 1825; hot blast; ore, local brown hematite; specialty, No. 1 foundry pig iron; annual capacity, 4,000 net tons. Brand, "Cumberland." J. P. Drouillard, President; Edgar Jones, Secretary; R. B. Stone, Superintendent. This is the oldest active furnace in Tennessee.

Knoxville Car-wheel Company, Knoxville. Furnaces at Carter's Furnace P. O., Carter county. Two stacks: Carter Furnace, 32 x 8, built in 1840, and Speedwell Furnace, 41 x 9, built in 1880; cold blast; water-power; ore, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 6,000 net tons. Brands, "Carter" and "Speedwell." Charles H. Brown, President; J. A. Quaife, Vice-President; W. P. Washburn, Secretary and Treasurer; James Esdale, Superintendent of wheel works.

La Grange Iron Company, Stribling, Stewart county. Main office, Room 1, Turner Building, St. Louis, Mo. One stack, 65 x 12, built in 1832, and rebuilt in 1880 and 1884; hot blast; ore, local brown hematite; specialty, machinery and foundry pig iron; annual capacity, 18,000 net tons. Brand, "La Grange." (Clark Furnace, 42 x 9½, built in 1854, abandoned in 1883.) E. C. Sterling, President; H. W. Eliot, Vice-President; G. F. Baker, Secretary and Treasurer; T. C. Baker, Manager, at the works.

Standard Furnace, Standard Charcoal Company, Goodrich, Hickman county. One stack, 45 x 9, first blown in December 23, 1885; hot blast; ore, local brown hematite; product, car-wheel and foundry pig iron; annual capacity, 8,000 net tons. Brand, "Standard." The company also manufactures wood alcohol and compounds for preserving timber. John H. Cowing, President, Buffalo, N. Y.; H. J. Pierce, Secretary; John L. Williams, Treasurer, Buffalo, N. Y.; H. M. Pierce, General Manager, Nashville, Tenn.; Superintendent, Dennis Church.

Warner Furnace, Warner Iron Company, Nashville. Furnace at Warner, Hickman county. One stack, 55 x 11, first put in blast November 12, 1881; hot or cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "Warner." James C. Warner, President; Leslie Warner, Secretary and Treasurer; Percy Warner, Vice-President and General Manager; L. S. Goodrich, Superintendent.

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

#### PROJECTED.

Sequatchie Coal and Iron Company, Nashville. Will build two coke furnaces near South Pittsburg, Marion county. The Nashville and Chattanooga Railroad has contracted to build a line to the property.

## OHIO.

## HANGING ROCK—CHARCOAL.

Bloom Furnace, J. D. Clare & Co., Bloom Switch, Scioto county. Telegraph address, Webster. One stack, 33 x 11, built in 1832, and rebuilt in 1846; hot blast; open top; ore, hematite; product, No. 1 foundry pig iron; annual capacity, 3,000 net tons. Brand, "Bloom." Furnace building lighted at night by natural gas from an 800-foot well. E. H. Clare, Secretary; Oliver Lyons, Manager.

Buckeye Furnace, Buckeye Furnace Company, Riverton, Jackson county. One stack, 40 x 10, built in 1851; open top; hot blast; ore, red limestone, mined on the property; specialty, No. 1 and No. 2 foundry pig iron; annual capacity, 4,000 net tons. Brand, "Buckeye." John D. Davis, Superintendent and Agent; T. J. Williams, Secretary.

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

Cornelia Furnace, Cornelia Furnace Company, Jackson, Jackson county. One stack, 37 x 10½, built in 1853, and first put in blast in 1854; open top; hot and cold blast; ore, principally local limestone; product, mainly No. 1 and No. 2 foundry and car-wheel pig iron; annual capacity, 4,000 net tons. Hot-blast iron brand, "Cornelia;" cold-blast, "Lincoln." First called Iron Valley Furnace and then Lincoln Furnace. J. M. McGhee, Agent. Selling agents, Matthew Addy & Co., Cincinnati.

Hamden Furnace, Damarin & Co., Portsmouth, Scioto county. Furnace at Hamden Junction P. O., Vinton county. One stack, 34 x 11, built in 1854; hot blast; open top; limestone ore from furnace lands; product, strong foundry pig iron, especially adapted for machinery; annual capacity, 4,000 net tons.

Hecla Furnace, Hecla Iron and Mining Company, Ironton, Lawrence county. Principal office at Hecla Furnace. One stack, 32½ x 10½, built in 1833; cold blast; open top; ores, local siderite and limonite; product, car-wheel and machinery pig iron; annual capacity, 3,100 net tons. Stopped on Sundays. Brand, "Hecla." John Campbell, President; Henry S. Neal, Vice-President; Charles Campbell, Secretary and Treasurer; M. T. Ridenour, Superintendent. Sales agents, James Collord, Pittsburgh; J. J. McDowell & Co., St. Louis; George S. Moore, Louisville; Rogers, Brown & Co., Cincinnati.

Howard Furnace, Albert Campbell, Agent, Lyra P. O., Scioto county. One stack, 36 x 10½, built in 1853; open top; hot or cold blast; ores, local yellow kidney, limestone, and red block; product, foundry pig iron; annual capacity, 3,500 net tons. Owned by a syndicate of

creditors, of which L. M. Beeman, of Thurman, Ohio, is Trustee. Jefferson Furnace, Jefferson Furnace Company, Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854; open top; cold blast; ore, local limestone; product, pig iron suitable for car-wheels and machinery; annual capacity, 3,000 net tons. Joseph J. Jones, Secretary; Eben J. Jones, Treasurer; J. D. Davis, Superintendent. Selling agents, E. L. Harper & Co., Cincinnati.

Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. Telegraph address, Ironton. One stack, 34 x 10, built in 1834, and rebuilt in 1860; cold blast; open top; ore, native limestone; product, car-wheel pig iron; annual capacity, 4,500 net tons. Brand, "Lawrence." W. H. Peters, President, Treasurer, and Manager; George Peters, Vice-President; J. F. Peters, Secretary. Not in blast since 1881.

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

Mount Vernon Furnace, George N. Gray, lessee, Ironton, Lawrence county. One stack, 32 x 10, built in 1833; open top; ore, native hematite; product, warm-blast car-wheel iron; annual capacity, 3,500 net tons. Brand, "Mt. Vernon."

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

Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 34 x 11, built in 1827, and rebuilt in 1844; open top; hot blast; limestone ore; product, strong foundry pig iron; annual capacity, 5,500 net tons. Brand, "Pine Grove." (Ohio Furnace, in Scioto county, built in 1845, has been abandoned.) Thomas W. Means, President; E. B. Willard, Secretary and Treasurer; A. R. Mackintosh, Manager. Selling agents, Rogers, Brown & Co., Cincinnati; James Collord, Pittsburgh; George S. Moore, Louisville. *See Hanging Rock Bituminous Furnaces.*

Scioto Furnace, Crawford & Leonard, Portsmouth, Scioto county. One stack, 32 x 10½, built in 1844; open top; hot blast; annual capacity, 4,000 net tons.

Vesuvius Furnace, Etna Iron Works, owners, Pedro, Lawrence county. Main office, Commercial Gazette Building, Cincinnati. One stack, 32 x 10, built in 1832, rebuilt in 1886; cold blast; open top; ore, native limestone; product, car-wheel pig iron; annual capacity, 3,500

net tons. Brand, "Vesuvius." Selling agents, A. Pluemer & Co., Cincinnati. *See Bituminous Furnaces for list of officers.*

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

#### HANGING ROCK—BITUMINOUS COAL OR COKE.

Belfont Furnace, Belfont Iron Works Company, Ironton, Lawrence county. One stack, 66 x 16, built in 1868; fuel, Connellsville coke and Kanawha coal; ores, Missouri and native; product, forge pig iron for nails; annual capacity, 15,000 net tons. *See Rolling Mills.*

Eliza Furnace, Eliza Furnace and Coal Company, Wellston, Jackson county. One stack, 52 x 13, built in 1877 from material of the abandoned Ophir Furnace, and blown in October 30, 1877; rebuilt in 1881, and remodeled in 1884; fuel, raw coal; limestone ore; product, No. 1 soft foundry pig iron; annual capacity, 8,000 net tons. Brand, "Eliza." H. S. Bundy, President; G. O. Richardson, Secretary. E. L. Harper & Co., sales agents, Cincinnati.

Etna Iron Works, Ironton. Main office, Commercial Gazette Building, Cincinnati. One completed stack, (Alice,) 86 x 18, first blown in September 13, 1875; four Whitwell hot-blast stoves; fuel, New River coke; ores, Hanging Rock and Kentucky; product, mostly foundry pig iron; present annual capacity, 26,000 net tons; improvements contemplated which will increase capacity to 32,000 tons. Brand, "Alice." One stack partly finished, (Blanche,) 86 x 18, will be completed to mate the Alice during 1887. D. N. Comingore, President and Treasurer; A. Pluemer, Vice-President and General Manager; J. William Johnson, Secretary; H. R. Brown, Superintendent. Selling agents, A. Pluemer & Co., Cincinnati. *See Hanging Rock Charcoal Furnaces.*

Fulton Furnace, Globe Iron Company, Jackson, Jackson county. One stack, 50 x 11½, built in 1868; fuel, raw coal; ore, native; annual capacity, 4,000 net tons.

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

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

Ironton Furnace, Ironton Furnace Company, lessees, Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; fuel, West Va. coke and Wellston raw coal; ores, Hanging Rock limestone; product, foundry pig iron and neutral gray forge for special bars and chains; annual capacity, 15,000 net tons. Brand, "Meta." E. J. Bird, Jr., President

and Manager; John Peters, Vice-President; James F. Peters, Secretary and Treasurer.

Milton Furnace, Milton Furnace and Coal Company, Wellston, Jackson county. One stack, 60 x 14, built in 1873-4, put in blast June 6, 1874; Whitwell hot-blast stoves; fuel, raw coal; ore, Hanging Rock limestone; product, soft, open-grained, foundry pig iron, known as "American Scotch;" annual capacity, 9,000 net tons. H. S. Willard, President and Superintendent; J. E. Ferree, Secretary.

Sarah Furnace, Sarah Furnace Company, lessees, Ironton, Lawrence county. One stack, 60 x 14, built in 1877, blown in March 18, 1878, and remodeled in 1886; three Whitwell hot-blast stoves; fuel, Virginia and Connellsville coke and raw coal; ore, native limonite; product, No. 1 foundry pig iron; annual capacity, 12,000 net tons. Brand, "Sarah." W. C. Amos, President and Manager; E. J. Bird, Jr., Vice-President; John H. Moulton, Secretary and Treasurer. Selling agents, Bacon & Floto, Cincinnati; George H. Hull & Co., Louisville.

Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, 54 x 14, built in 1866, and rebuilt in 1879; fuel,  $\frac{3}{4}$  native raw coal and  $\frac{1}{4}$  West Va. coke; ores, native limonite and block; product, Nos. 1 and 2 silver gray foundry and gray mill irons; annual capacity, 9,000 net tons. Isaac Brown, President; B. Kahn, Secretary; L. V. Brown, Manager. Selling agents, Matthew Addy & Co., Cincinnati; Tod, Stambaugh & Co., Cleveland.

Tropic Furnace, Tropic Furnace Company, Jackson, Jackson county. One stack, 47 x 13, built in 1872-3, and rebuilt in 1879; hot blast; fuel, raw coal; ores, native limestone and block; product, foundry and mill pig iron; annual capacity, 6,000 net tons. H. L. Chapman, President; J. C. Jones, Secretary and Treasurer; Miles Jones, Superintendent.

Wellston Furnace, King, Gilbert & Warner, lessees, Columbus. Furnace at Wellston, Jackson county. One stack, 52 x 13, built in 1874-5, remodeled in 1879; local limestone ores; product, neutral foundry pig iron; annual capacity, 7,300 net tons. (One stack, built in 1874-5, abandoned in 1881.) See *Franklin Furnace, Miscellaneous Bituminous*. Number of bituminous furnaces in Hanging Rock region of Ohio: 12 completed stacks, and one partly completed.

#### MAHONING VALLEY—BITUMINOUS COAL OR COKE.

Anna Furnace, Struthers Furnace Company, lessees, Struthers, Mahoning county. One stack, 75 x 16, built in 1869, rebuilt in 1881; fuel, Connellsville coke; ore, Lake Superior; specialty, strong neutral foundry pig iron; annual capacity, 40,000 net tons. Brand, "Struthers." James Pickands, President, Cleveland; Myron C. Wick, Vice-President, Youngstown; Robert Bentley, Secretary, Treasurer, and General Manager, Lowellville. Selling agents, Pickands, Brown & Co., Chicago, and Pickands, Mather & Co., Cleveland.

Brier Hill Iron and Coal Company, Youngstown, Mahoning county. Three stacks: Tod Furnace, 66½ x 14, built in 1846, and rebuilt in 1879; product, foundry pig iron. Grace Furnace No. 1, 80 x 18, built in 1861, torn down in 1873, and rebuilt in 1882; Grace Furnace No. 2, 57 x 17½, built in 1861; specialty, Bessemer pig iron. (A fourth furnace, not now in use, is Tod Furnace No. 2, 45 x 10½, built in 1880.) Fuel, coke and block coal; ores, Lake Superior and blackband; total annual capacity, 75,000 net tons. Brands, "Brier Hill" and "Grace." John Stambaugh, President; H. H. Stambaugh, Secretary and Treasurer; J. G. Butler, Jr., General Manager. *See Himrod Furnaces.*

Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Two stacks: Falcon Furnace, 55 x 12½, built about 1850; Phoenix Furnace, 60 x 15, built in 1854; ore, Lake Superior; fuel, Connellsville coke; product, forge pig iron; total annual capacity, 62,000 net tons. Brand, "Mahoning." *See Rolling Mills.*

Girard Furnace, Girard Iron Company, Girard, Trumbull county. One stack, 75 x 16, built in 1866, remodeled in 1879, and stack raised in 1884; fuel, Connellsville coke exclusively; ore, Lake Superior; product, mill pig iron; annual capacity, 45,000 net tons. Brand, "Girard." A. M. Byers, sole owner, Pittsburgh; Henry B. Shields, Manager, Girard.

Hannah Furnace, Mahoning Valley Iron Company, Youngstown. One stack, 66½ x 16, first put in blast June 14, 1880; built mainly of material composing Elizabeth Furnace, erected at Niles in 1859; fuel, Connellsville coke and native block coal; ore, Lake Superior; product, mill pig iron, all used in the company's mill; annual capacity, 30,000 net tons. Thomas H. Pollock, Manager. *See Rolling Mills.*

Haselton Iron Works, Andrews Brothers & Co., Haselton, Mahoning county. Branch office at Youngstown. One stack, 75 x 18, built in 1867 and rebuilt in 1880; fuel, coke; product, Bessemer, foundry, and mill pig iron from Lake Superior ores, and "American Scotch" pig iron from a blackband ore obtained at Mineral Ridge, 12 miles from the furnaces; annual capacity, 36,000 net tons. Brand, "Haselton." (A second stack, 56 x 13½, built in 1868, not now in use.) *See Rolling Mills.*

Himrod Furnaces, Brier Hill Iron and Coal Company, lessees, Youngstown, Mahoning county. Two stacks, 70 x 15 and 70 x 16, built in 1859 and 1860, and rebuilt in 1876; fuel, coke; ores, Lake Superior; product, Bessemer pig iron; annual capacity, No. 1, 30,000 net tons; No. 2, 35,000 net tons. (Another stack, 48 x 13, built in 1868, not now in use.) *See Brier Hill Iron and Coal Company.*

Hubbard Furnaces, Andrews & Hitchcock, Youngstown, Mahoning county. Works at Hubbard, Trumbull county. Two stacks, 75 x 16 and 77 x 17, built in 1867 and 1872; one rebuilt in 1883, and the other rebuilt in 1886; fuel, Connellsville coke; product, principally foundry pig iron. "Hubbard strong foundry" is made of a mixture of Lake Superior specular and magnetic ores; "Hubbard Scotch" is made

from  $\frac{1}{2}$  Trumbull county blackband ores and  $\frac{1}{2}$  Lake Superior ore, and sells in place of Scotch pig iron. Total annual capacity, 73,000 net tons.

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

Thomas Furnace, Thomas Furnace Company, Niles, Trumbull county. One stack, 71 x 16, built in 1870, and enlarged in 1883; fuel, Connellsville coke; ores, Mineral Ridge blackband and Lake Superior; annual capacity, 35,000 net tons. Brand, "Niles." J. R. Thomas, Manager. Number of bituminous furnaces in the Mahoning valley: 15 stacks.

#### HOCKING VALLEY—BITUMINOUS COAL OR COKE.

Baird Furnace, Baird Iron Company, Gore, Hocking county. Furnace in Perry county. One stack, 54 x 12 $\frac{1}{2}$ , built in 1874-5, and blown in October 9, 1875; rebuilt in 1886; fuel, raw semi-bituminous coal; ore, native limestone; product, strong No. 1 foundry pig iron; annual capacity, 8,000 net tons. Brand, "Baird." F. B. Baird, President; F. B. McElhuinie, Secretary; C. R. Baird, Cashier; Henry Davis, Superintendent. Selling agents, King, Gilbert & Warner, Columbus.

Columbus and Hocking Coal and Iron Company, Columbus. Five stacks: Akron Furnace, at Buchtel, Athens county, one stack, 60 x 16, built at Akron in 1872, removed to Buchtel in 1877, and blown in November 30, 1877. Bessie Furnace, at New Straitsville, Perry county, one stack, 60 x 14, built in 1877-8, and blown in January 21, 1878; four Whitwell hot-blast stoves, each 36 x 15. Crafts Furnace, at Greendale, Hocking county, one stack, 58 x 15, first put in blast November 8, 1879; its machinery was formerly used at Kenton Furnace, at Newport, Kentucky, built in 1869, dismantled in 1877. Gore Furnace, at Gore, Hocking county, one stack, 60 x 13, built in 1876, blown in December 8, 1876. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12 $\frac{1}{2}$ , completed and blown in February 20, 1878; three Whitwell hot-blast stoves. Fuel, raw bituminous coal, obtained from the company's mines near the furnaces; ores, native and Lake Superior; product, foundry pig iron; total annual capacity, 90,000 net tons. Walter Crafts, President and Treasurer; J. R. Buchtel, Vice-President; H. D. Turney, Secretary; H. F. Holloway, Assistant Secretary; F. W. Merrick, Attorney.

Fannie Furnaces, Licking Iron Company, Shawnee, Perry county. Two stacks: No. 1, 47 x 11 $\frac{1}{2}$ , built in 1874-5 at Newark, removed to Shaw-



nee in 1876, and blown in September 15, 1876; No. 2, 47 x 13, first put in blast October 10, 1877; extensive improvements made in 1884; fuel, raw bituminous coal; ore, Lake Superior; product, American Scotch foundry pig iron; total annual capacity, 13,000 net tons. Brand, "Hattie." John C. Hamilton, President; Walter L. Rous, Secretary; E. Snowden, Treasurer; Jacob H. Opperman, Superintendent. E. L. Harper & Co., Cincinnati, sole sales agents.

Moxahala Furnace, Moxahala Iron Company, Moxahala, Perry county. One stack, 55½ x 15, built in 1877-8, and blown in January 5, 1878. Not in blast for several years.

New York Furnace, New York and Perry Coal and Iron Company, Shawnee, Perry county. One stack, 50 x 14½, built in 1877, and blown in November 10, 1877; fuel, raw coal; ores, native from the company's property and Lake Superior ore; product, No. 1 foundry pig iron; annual capacity, 15,000 net tons. Formerly called Mollie Furnace. C. R. Griggs, President; George A. Blood, Vice-President and General Manager; A. Howard Carner, Secretary; F. P. Perkins, Treasurer.

Ohio and Western Coal and Iron Company, 106 South High st., Columbus. Three completed stacks and two partly completed stacks: Helen Furnace, at Orbiston, Hocking county, one stack, 52 x 15, built in 1877, and first blown in in December, 1877. Lee Furnace, at Monday, Hocking county, one stack, 52½ x 14, built in 1877-8, and first blown in in March, 1878. XX Furnace, at Shawnee, Perry county, one stack, 50 x 14, built in 1876-7, and first blown in January 18, 1877. Buchtel Furnaces, at Floodwood, Athens county, two stacks, each 60 x 16, partly completed. Fuel used is mainly raw coal, mixed with some coke; ores, native limestone, with some Lake Superior; product, principally foundry pig iron. John Cummings, General Manager; H. C. Stanwood, Assistant Treasurer.

Number of bituminous furnaces in the Hocking valley: 13 completed stacks, and 2 partly completed.

#### MISCELLANEOUS BITUMINOUS—EASTERN OHIO AND CLEVELAND.

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

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

Cherry Valley Furnaces, Cherry Valley Iron Works, Leetonia, Columbiana county. Two stacks: No. 1, 55 x 14, built in 1867; and No. 2, 75 x 16, built in 1868, and rebuilt in 1883; fuel, coke and raw coal; ores, native and Lake Superior mixed; specialty, "American Scotch" foundry pig iron.

dry pig iron; total annual capacity, 33,000 net tons. Brand, "Cherry Valley." Selling agents, King, Gilbert & Warner, Columbus. *See Rolling Mills.*

Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Four stacks: River Furnaces, two stacks, as follows: Proton Furnace, formerly operated by the Cleveland Iron Company, 60 x 16, built in 1869, and rebuilt in 1878; the second stack, 70 x 17, built near Proton Furnace in 1879, and blown in October 15, 1879. Central Furnace, 75 x 20, built in 1881-2; Whitwell stoves. Newburgh Furnace, 65 x 16, built in 1872, and remodeled in 1886. Fuel, raw coal and coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; total annual capacity, 135,000 net tons. (Another furnace at Newburgh, built in 1864, was abandoned and torn down in 1884.) *See Rolling Mills.*

Dover Furnace, Penn Iron and Coal Company, Canal Dover, Tuscarawas county. One stack, 66 x 15, built in 1854, rebuilt in 1878-9; fuel, raw coal and Connellsville coke; ores, native, with mixture of Lake Superior; product, foundry pig iron; annual capacity, 20,000 net tons. Brand, "Tuscarawas." Old furnace called Fairfield Furnace. J. P. Burton, President, Massillon, Ohio; E. M. Davis, Vice-President, Philadelphia; W. H. Squires, Secretary; S. W. Croxton, Treasurer and General Manager, Canal Dover. Selling agents, M. A. Hanna & Co., Cleveland; M. Addy & Co., St. Louis; Forsyth, Hyde & Co., Chicago.

Emma Furnace, Union Rolling Mill Company, Cleveland, Cuyahoga county. One stack, 80 x 18, built in 1872, and remodeled in 1882-3; fuel, Connellsville coke; ore, Lake Superior; product, foundry and forge pig iron; annual capacity, 35,000 net tons. Brand, "Emma." S. A. Fuller, General Manager. Selling agents, Condit, Fuller & Co. *See Rolling Mills.*

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

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

Jefferson Iron Works, Steubenville, Jefferson county. One stack, 58 x 14½, built in 1863, rebuilt in 1877 and 1886; two Gordon-Whitwell-Cowper fire-brick stoves. (Furnace No. 2, which was built in 1865, is to be rebuilt before being blown in again.) Fuel, Connellsville and Steubenville coke; ores, Missouri and Lake Superior; specialty, Bessemer pig iron; annual capacity, 34,000 net tons. Brand, "Jefferson." Pig iron sold by Jefferson Iron Works, or by Nimick & Co. and John B. Herron, Pittsburgh. *See Rolling Mills.*

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

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

Zanesville Furnace, Ohio Iron Company, Zanesville, Muskingum county. One stack, 75 x 15½, built in 1870-1, blown in September 7, 1871, rebuilt in 1883; 3 Whitwell fire-brick hot-blast stoves, each 65 x 17; fuel, raw coal and Connellsville coke; ore, Lake Superior; product, forge and foundry pig iron; annual capacity, 34,000 net tons. *See Rolling Mills.*

Number of bituminous coal or coke furnaces in Ohio outside of the Hanging Rock, Mahoning Valley, and Hocking Valley districts: 18 stacks.

#### NORTHWESTERN—CHARCOAL.

Paulding Furnace, Paulding Iron Company Limited, lessee, Cecil, Paulding county. One stack, 41½ x 8½, built in 1865; hot blast; ore, Lake Superior; specialty, car-wheel pig iron; annual capacity, 10,000 net tons. James I. Bennett, Chairman; J. H. King, Treasurer; S. Frank Eagle, Secretary and Superintendent. *See Bloomeries.*

Number of charcoal furnaces in Ohio outside of Hanging Rock region: one stack. Total number of furnaces in Ohio: 75 completed stacks and 3 partly completed.

### INDIANA.

#### BITUMINOUS BLOCK COAL.

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

Vigo Furnace, Vigo Iron Company, Terre Haute, Vigo county. One stack, 52 x 12, built in 1872, and blown in in 1873; fuel, raw coal; ore, Missouri; specialty, forge pig iron; annual capacity, 8,000 net tons. Brand, "Vigo." (The No. 1 furnace, built in 1869, was torn down in 1882 and removed to Alabama.) A. L. Crawford, President; A. J. Crawford, Secretary, Treasurer, and Manager.

Number of furnaces in Indiana: 2 bituminous stacks.

## ILLINOIS.

## BITUMINOUS COAL OR COKE.

- Big Muddy Furnace, Lewis Iron Company, 210 North Third street, St. Louis, Mo. Furnace at Grand Tower, Jackson county. One stack, 69 x 17, built in 1871; weekly capacity, 315 net tons. B. W. Lewis, President; William Spear, Secretary and Treasurer.
- Calumet Furnace, Calumet Iron and Steel Company, First National Bank Building, Chicago. Works at Cummings, Cook county. One stack, 75 x 18, built in 1880; 3 Siemens-Cowper-Cochrane fire-brick stoves; fuel, Connellsville coke and Brazil coal; ores, Lake Superior and Menominee; product, foundry and mill pig iron; annual capacity, 50,000 net tons. Brand, "Calumet." *See Rolling Mills.*
- Joliet Steel Company, Home Insurance Building, Chicago. Two stacks: Ethel Furnaces No. 1 and No. 2, at Joliet, Will county, each 80 x 20, built in 1873; No. 1 first put in blast in June, 1880, and No. 2 first put in blast in January, 1882; 3 Gordon improved Whitwell and 3 Siemens-Cowper-Cochrane fire-brick stoves; fuel, Connellsville coke; ores, Lake Superior and Missouri; product, Bessemer pig iron; total annual capacity, 160,000 net tons. *See Rolling Mills.*
- Meier Furnaces, Meier Iron Company, 102 North Main st., St. Louis. Furnaces at Bessemer Station, near East Carondelet, St. Clair county. Two stacks, each 60 x 17, built in 1873-5, but blown in for the first time in 1880; eight Whitwell hot-blast stoves; fuel, coke; ore, Missouri specular and hematites; total annual capacity, 56,000 net tons. Adolphus Meier, President; Theodore G. Meier, Vice-President; E. D. Meier, Secretary; John W. Meier, Treasurer.
- North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Cook county. Six stacks in Illinois: Chicago Furnaces, located at Chicago, on north branch of Chicago river, at the foot of Waubansia avenue, have two stacks, (Nos. 1 and 2,) each 66 x 17, built in 1869. South Chicago Furnaces, located at South Chicago, have four stacks, (Nos. 5, 6, 7, and 8,) each 75 x 21, built in 1880-1, two of which were put in blast in 1881, and two were put in blast in 1882. The Chicago Furnaces have 6 Player iron stoves, and the South Chicago Furnaces have 12 fire-brick stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity of Chicago Furnaces, 80,000 net tons, and of South Chicago Furnaces, 287,000 net tons. E. C. Potter, Superintendent. *See Wisconsin Furnaces. See Rolling Mills in Illinois and Wisconsin.*
- Union (The) Steel Company, 302 First National Bank Building, Chicago. Four stacks: Two, each 72 x 14, built in 1869 and rebuilt in 1885; two Cowper fire-brick stoves. Two, each 74 x 16, built in 1881 and 1882; six Whitwell stoves. Fuel used by all these furnaces, Connellsville coke; ore, Lake Superior; specialty, Bessemer pig iron. *See Rolling Mills.*
- Total number of furnaces in Illinois: 16 bituminous stacks.

## MISSOURI.

## COKE.

Jupiter Iron Works, Jupiter Furnace Company, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873, blown in for the first time in 1880; fuel, coke; ores, Iron Mountain and Pilot Knob and about  $\frac{1}{2}$  red hematite; annual capacity, 33,000 net tons. D. R. Garrison, President; O. A. Hart, Vice-President; W. O. Garrison, Secretary.

Missouri Furnaces, Missouri Furnace Company, 204 North Third st., St. Louis. Two stacks, each 56 x 15, built in 1870; fuel, Connellsville coke; ores, Iron Mountain, Shepherd Mountain, Pilot Knob, and Southwest; product, mainly Bessemer pig iron; total annual capacity, 40,000 net tons. Brand, "Missouri." Oliver B. Filley, President; Edwin C. Cushman, Vice-President; Charles A. McNair, Secretary.

South St. Louis Iron Company, St. Louis. Two stacks, each 56 x 15, built in 1870 and 1872; fuel, Connellsville coke; specialty, Bessemer pig iron; total annual capacity, 40,000 net tons. E. T. Allen, President, 404 Market st. Property for sale or lease.

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

Number of coke furnaces in Missouri: 8 stacks.

## CHARCOAL.

Midland Furnace, Midland Blast-Furnace Company, Midland, Crawford county. Main office, Turner Building, St. Louis. One stack, 50 x 10, built in 1874-5, and blown in April 10, 1875, rebuilt in 1877; either cold or hot blast; ore, red and brown hematite; product, pig iron for steel purposes; annual capacity, 15,000 net tons. This furnace stack is wholly built of fire-brick, 22 $\frac{1}{2}$  inches thick. Brand, "Midland." William H. Lee, President; E. A. Hitchcock, Vice-President; T. F. Turner, Secretary; B. B. Reagan, Superintendent.

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

Pilot Knob Furnace, St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer Building, corner Broadway and Locust sts., St. Louis. Furnace at Pilot Knob, Iron county. One stack, 60 x 11, built in 1848, remodeled in 1879; hot blast; ore, Pilot Knob; product, Bessemer pig iron; annual capacity, 12,000 net tons. J. C. Simpson, Manager.

Sligo Furnace Company, Sligo Furnace P. O., Dent county. General

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

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

## MICHIGAN.

### CHARCOAL.

Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. One stack, 48 x 9½, first put in blast December 25, 1882; burned May 29, 1883, and rebuilt; hot blast; charcoal supplied by 41 round brick kilns, of an average capacity of 75 cords; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 15,000 net tons. Brand, "Antrim." Furnace formerly called Otis Furnace. T. J. O'Brien, President; J. M. Barnett, Vice-President; J. C. Holt, Secretary and Treasurer; E. Fitzgerald, General Manager, Mancelona. Sales agents, Mack & Durkee, Chicago.

Bangor Furnace, Bradley, Graves & Co. Limited, Bangor, Van Buren county. One stack, 43 x 9½, first blown in October 29, 1872; hot blast; ore, Lake Superior; product, Bessemer, car-wheel, and malleable pig iron; annual capacity, 16,000 net tons. Brand, "Bangor." D. C. Bradley, Chairman, Chicago; J. J. Hagerman, Secretary, Milwaukee; George L. Graves, Treasurer, Milwaukee; W. H. Nelson, Superintendent, Bangor. Selling agents, Forsythe, Hyde & Co., Chicago.

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

Detroit Iron Furnace Company, Detroit. One stack, 52 x 10½, built in 1870; changed from bituminous coal to charcoal in 1879; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; daily capacity, 56 net tons. Brand, "D. I. F." James McMillan, President; Hugh McMillan, Vice-President and Treasurer; E. C. Wetmore, Secretary; Lee Burt, Manager, 49 Newberry and McMillan Building, Detroit. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim county. Chicago office, 19 Wabash avenue. One stack, 47 x 11½, first put in blast in July, 1873; hot blast; ore, Lake Superior entirely; specialty, Nos. 3 and 4 pig iron for car-wheels and malleable castings; daily average production, 67 net tons. The charcoal for this furnace is

made in ten round and twenty-five rectangular brick kilns, holding, respectively, 50 and 100 cords each; chemical works are connected with them. Brand, "Elk Rapids." N. K. Fairbank, President, and F. H. Head, Vice-President, Chicago; E. S. Noble, Secretary and Treasurer, Elk Rapids; H. H. Noble, General Manager, Elk Rapids. Selling agent, F. H. Head, 59 Wabash avenue, Chicago.

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

Fayette Furnaces, Jackson Iron Company, Fayette, Delta county. Two stacks, each 52 x 10, built in 1867 and 1869, rebuilt in 1881; hot blast; ores, Jackson specular and South Side manganiferous hematite; product, Bessemer, foundry, malleable, and car-wheel pig iron; total annual capacity, 35,000 net tons. Iron is known as "Fayette." The furnaces are 80 miles from the company's mines at Negaunee; built at Fayette owing to the abundance of timber. There are 64 charcoal kilns. David Stewart, President, and Gardner P. Lloyd, Secretary and Treasurer, 119 Broadway, New York; Fayette Brown, General Agent, Cleveland, Ohio; H. H. Brown, Assistant General Agent, Cleveland; Henry Merry, Agent, Fayette.

Frankfort Furnace Company, 32 and 34 Woodward avenue, (with Detroit Stove Works,) Detroit. Furnaces at South Frankfort, Benzie county. Two stacks, each 42 x 9½, built in 1870 and 1873; hot blast; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; total annual capacity, 27,000 net tons. M. B. Mills, President; W. H. Irvine, Secretary. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Gaylord Iron Company, (successor to Detroit and Lake Superior Iron Manufacturing Company,) Detroit, Wayne county. One stone stack, 40 x 9½, built in 1857, and first put in blast March 16, 1857; warm blast; ores, Lake Superior specular, magnetic, and hematite; the pig iron is specially adapted to malleable castings; annual capacity, 9,000 net tons. Charles A. Kent, President; William H. Barnum, Vice-President; William M. Gaylord, Treasurer and General Manager.

Iron River Furnace, Iron River Furnace Company, Fond du Lac, Wisconsin. Furnace at Iron River, Marquette county, Michigan. One stack, 56 x 11, built in 1885, and first blown in February 2, 1886; ores, local limonite and Gogebic; product, foundry, car-wheel, and malleable pig iron. John S. McDonald, President; Alexander McDonald, Vice-President; John Spence, Secretary; L. Muentner, Treasurer; John T. Jones, Superintendent. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Iron Star Furnace Company, (formerly Leland Iron Company,) 12 and



- 13 Campan Building, Detroit. Furnace at Leland, Leelenaw county. One stack, 48 x 10, rebuilt in 1872; hot blast; water-power; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 13,500 net tons. Brand, "Iron Star." V. K. Moore, President; George W. Moore, Secretary and Treasurer.
- Lake Huron Furnace, Lake Huron Iron Company, Caseville, Huron county. One stack, 54 x 9½, built in 1873, rebuilt in 1881; hot blast; ore, Lake Superior; daily capacity, 35 net tons. A. G. Stone, Vice-President and Treasurer, Cleveland; D. E. Stone, Secretary, Cleveland.
- Martel Furnace Company, St. Ignace, Mackinac county. One stack, 53 x 10½, first put in blast August 15, 1881; two Whitwell fire-brick hot-blast stoves, each 60 x 15; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 23,000 net tons. Brand, "Martel." The furnace does not run on Sunday. Charcoal is made with Mathieu's retorts; by-products, refined wood alcohol, tar, pitch, acetate of lime, etc. W. R. Davenport, President, Erie, Pa.; John Fairbairn, Vice-President, and William B. Vance, Secretary and Treasurer, both at St. Ignace; S. D. Mills, Superintendent of chemical works.
- Menominee Furnace, Menominee Furnace Company, Menominee, Menominee county. One stack, 45 x 9½, built in 1872-3, blown in in August, 1873; hot blast; ore, Lake Superior; annual capacity, 10,000 net tons. A. B. Meeker, President, Chicago.
- Peninsular Furnace, Peninsular Iron Company, Detroit, Wayne county. One stack, 42 x 9½, built in 1863, put in blast in February, 1864; warm blast; open top, covered by a plate when not filling; ore, exclusively Lake Superior; specialty, car-wheel and malleable pig iron; annual capacity, 10,000 net tons. Brand, "P. I. Co., Det." Supply Chase, President; Theodore H. Ealon, Jr., Vice-President; Solon Burt, Secretary and Treasurer.
- Pine Lake Furnace, Pine Lake Iron Company, Ironton, Charlevoix county. General office, 90 and 92 Dearborn st., Chicago. One stack, 52 x 10½, built in 1880-1, and put in blast in February, 1881; hot blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; estimated annual capacity, 18,000 net tons. Brand, "Champion." R. M. Cherrie, President, and H. C. Dolph, Secretary and Treasurer, 92 Dearborn st., Chicago; M. R. Hunt, Superintendent, Ironton. Sales agents, Cherrie & Co., 92 Dearborn st., Chicago.
- Pioneer Furnaces, Iron Cliffs Company, Negaunee, Marquette county. Two stacks: No. 1, 56 x 10, built in 1858; No. 2, 56 x 9, built in 1859; both stacks burned and rebuilt in 1877. (Cliffs Furnace has been abandoned.) Ores, Lake Superior, ½ red specular and ½ soft hematite; product, malleable and car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Pioneer." John H. Abeel, President; Charles J. Canda, Treasurer, 52 William st., New York; A. Maitland, General Manager; James Rood, Agent, Chicago.
- Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 46 x 11, built in 1879-80, first blown in March 2, 1880; ore, Lake Su-

perior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 19,500 net tons. Principal office at Milwaukee, Wis.: Samuel Marshall, President; Irving M. Bean, Vice-President and Treasurer. J. C. Ford, Superintendent, Fruitport. Selling agents, Pickands, Brown & Co., 95 Dearborn st., Chicago.

Union Iron Company, Jefferson avenue east, Detroit, Wayne county. One stack, 50 x 10½, built in 1871-2, and blown in in July, 1872; warm blast; ore, Lake Superior; specialty, malleable and car-wheel pig iron; annual capacity, 9,000 net tons. Brand, "U. I. Co., Det." Wells Burt, President; Austin Burt, Secretary, Treasurer, and Manager.

Vulcan Furnace Company, Newberry and McMillan Building, Detroit. Furnace at Newberry, Chippewa county. One stack, 53 x 10½, built in 1882-3, and blown in in May, 1883; four iron hot-blast stoves; water jackets; closed top, with Lee Burt's patent charger; ore, hard and soft Lake Superior; product, car-wheel, malleable, and Bessemer pig iron; annual capacity, 22,000 net tons. Brand, "D. I. F. V." James McMillan, President; John S. Newberry, Vice-President; S. E. Driggs, Secretary; Hugh McMillan, Treasurer; Lee Burt, Manager, 49 Newberry and McMillan Building, Detroit. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Number of charcoal furnaces in Michigan: 25 stacks.

#### MIXED ANTHRACITE AND BITUMINOUS COAL OR COKE.

Grace Furnace, Traverse Iron Company, 88 Washington st., Chicago.

Furnace at Marquette. One stack, 63 x 17, built in 1872; fuel, mixed anthracite and bituminous coal; annual capacity, 15,000 net tons.

Number of mixed anthracite and bituminous furnaces in Michigan: one stack. Total number of furnaces in Michigan: 26 stacks.

### WISCONSIN.

#### CHARCOAL.

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

Florence Furnace, H. C. Dolph, owner, 92 Dearborn st., Chicago. Furnace at Florence, Marinette county. One stack, 40 x 8, first blown in November 13, 1881; hot blast; ore, Menominee Range hematite; specialty, car-wheel pig iron; annual capacity, 6,000 net tons. Brand, "Champion." H. W. Jackson, Agent, Selling agents, Cherrie & Co., Chicago.

Fond du Lac Furnace, Fond du Lac Iron Company, Fond du Lac, Fond du Lac county. One stack, 52 x 10½, built in 1873-4, and first put in blast in 1883; hot blast; ore, Lake Superior; annual capacity, 10,000

net tons. J. H. Cooledge, President; A. G. Ruggles, Vice-President; J. B. Perry, Secretary; E. A. Carey, Treasurer and Manager.

Fox River Furnaces, West Depere, Brown county. Two stacks, 40 x 9½ and 50 x 10, one built in 1869, the other built in 1872; hot blast; ores, from Lake Superior and Menominee Range; total annual capacity, 18,500 net tons. Owned by Rogers & Co., 90 Dearborn st., Chicago.

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

Mayville Furnace, Northwestern Iron Company, Mayville, Dodge county. Office, 406 Milwaukee st., Milwaukee. One stack, 50 x 10, built in 1848, rebuilt in 1872 and 1884; fuel, charcoal and coke; ore, Iron Ridge, a red hematite, from the company's mines located near the furnace; product, foundry pig iron; annual capacity, 9,000 net tons. Brand, "Irving." Irving M. Bean, President; Charles F. Ilsley, Vice-President; A. C. May, Secretary and Treasurer; F. L. Barrows, Superintendent. Selling agents, Pickands, Brown & Co., Chicago.

Minneapolis Furnace, York Iron Company, Black River Falls P. O., Jackson county. Main office, Minneapolis, Minnesota. One stack, 55 x 11, built in 1885-6; blown in in July, 1886; two Whitwell stoves, each 60 x 16; ore, local hematite and magnetic; annual capacity, 16,000 net tons. Brand, "Minneapolis." Samuel C. Gale, President; James E. York, Vice-President; J. Hyde Monroe, Secretary; Otis A. Pray, Treasurer; Horace E. Burt, Manager of Works.

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

Number of charcoal furnaces in Wisconsin: 11 stacks.

#### COKE.

Bay View Furnaces, North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 37 Mitchell Block, Milwaukee. Works at Bay View, Milwaukee county, near Milwaukee. Two stacks, (Nos. 3 and 4,) each 66 x 17, built in 1870 and 1871; fuel, Connellsville coke; ores, ½ Lake Superior and ½ Iron Ridge; product, Bessemer, foundry,

and mill pig iron; total annual capacity, 65,000 net tons. Brand, "Bay View." *See Illinois Furnaces. See Rolling Mills in Illinois and Wisconsin.* Minerva Furnace, Minerva Iron Company, 82 Michigan st., Milwaukee. One stack, 55 x 15, built and put in blast in the summer of 1873; annual capacity, 22,000 net tons. S. A. Harrison, President; S. M. Green, Secretary; R. W. Pierce, Treasurer. Number of coke furnaces in Wisconsin: 3 stacks. Total number of furnaces in Wisconsin: 14 stacks.

## PROJECTED.

Charcoal furnace at Ashland, Ashland county.

## MINNESOTA.

## CHARCOAL.

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

Number of furnaces in Minnesota: one charcoal stack.

## COLORADO.

## COKE.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. New York office, 41 and 43 Wall st. One stack, 65 x 15, built in 1880-81, and blown in September 7, 1881; three Siemens-Cowper-Cochrane fire-brick stoves; fuel, coke, produced at the company's coke ovens at El Moro; ores, native magnetic and hematite; annual capacity, 24,000 net tons. Another stack of the same size has been partly completed. *See Rolling Mills.*

Number of furnaces in Colorado: one completed coke stack, and one partly completed.

## CALIFORNIA.

## CHARCOAL.

California Iron and Steel Company, Hotaling, Placer county. Office, 329 Market st., San Francisco. One stack, 45 x 10, built in 1879-80, and first blown in April 24, 1881; burned in September, 1882, and rebuilt in 1883; hot blast; fuel, charcoal; ore, magnetic, mined at the furnace; product, foundry and car-wheel pig iron, very strong; annual capacity, 12,000 net tons. Egbert Judson, President; George W. Gibbs, Vice-President; George O. Davis, Secretary; C. B. Morgan, Treasurer;

U. Seeley, Jr., Superintendent. Furnace blown out in 1886, not to resume under present organization.

Number of furnaces in California: one charcoal stack.

## OREGON.

### CHARCOAL.

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

Number of furnaces in Oregon: one charcoal stack.

## WASHINGTON TERRITORY.

### CHARCOAL.

Irondale Furnace, Puget Sound Iron Company, Irondale, Jefferson county. Main office, 328 Montgomery st., San Francisco, Cal. One stack, 50 x 10, built in 1880-1, and blown in January 27, 1881; rebuilt in 1882-3, and remodeled in 1884; hot blast; open top; fuel, charcoal; ores, bog and magnetic, mined in Jefferson county, and also on Texada Island, British Columbia; product, No. 1 foundry pig iron; annual capacity, 10,000 net tons. Brand, "Texada." John A. Paxton, President; A. Chabot, Vice-President; Charles H. Simpkins, Treasurer; A. Halsey, Secretary; J. L. Smith, Superintendent. Selling agent, C. H. Simpkins, San Francisco. Steel plant projected in connection with this furnace.

Number of furnaces in Washington Territory: one charcoal stack.

## UNITED STATES.

Total number of furnaces in the United States on July 15, 1886, which are in blast or not likely to long remain idle: 578 completed stacks, and 19 stacks building. There are 174 completed charcoal furnaces, 201 anthracite or mixed anthracite and coke furnaces, and 203 furnaces using coke or raw bituminous coal chiefly. Of the 19 furnaces under construction 12 are coke, 4 are anthracite, and 3 are charcoal. There are also 6 furnaces in various parts of the country which have been partly constructed, but on which work has been suspended.

## FURNACES RECENTLY ABANDONED OR LIKELY TO BE LONG INACTIVE.

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

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### VERMONT.

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

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

### MASSACHUSETTS.

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

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

### CONNECTICUT.

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

### NEW YORK.

#### CHARCOAL.

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

Carthage Furnace, Carthage Iron Company, Carthage, Jefferson county. One stack, built in 1818, and rebuilt in 1881. Burned in 1885 and not rebuilt.

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

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

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

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

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

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

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

## ANTHRACITE AND COKE.

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

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

Jagger Iron Company, Albany. Two stacks, on Van Rensselaer Island, built in 1871. Formerly called Corning Iron Works. Will not be blown in again unless the price of pig iron advances considerably.

Niagara River Iron Company, Buffalo. Furnace at Ironton, Niagara county. One stack, built in 1873, but only in blast for a short time. Equipment in good order.

Poughkeepsie Iron Company, Albert Tower, President and Agent, Poughkeepsie, Dutchess county. Two stacks, built in 1848 and 1854; not in blast in 1886 and probably never will be again unless prices advance considerably.

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

## NEW JERSEY.

Stephens Furnace, Rustic, Morris county. Built in 1877.

## PENNSYLVANIA.

## ANTHRACITE.

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

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

Donegal Furnace, Benson & Cottrell, Columbia, Lancaster county. Furnace at Vesta, near Marietta. One stack, built in 1848.

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

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



- Lycoming Furnace, Ralston, Lycoming county. One stack, first put in operation in August, 1874, but only in blast for a short time.
- Mansfield Furnace, Mansfield, Tioga county. One stack, built in 1854. Abandoned in 1884.
- Stanhope Furnace, Thomas Cooch, Pottsville. Furnace at Pine Grove, Schuylkill county. Built in 1825; not in blast since 1880.
- St. Clair Furnace, St. Clair, Schuylkill county. Built in 1845; abandoned in 1880.

## BITUMINOUS COAL AND COKE.

- Bennington Furnace, Blair Iron and Coal Company, Bennington, Blair county. One stack, built in 1856; abandoned in 1885.
- Brady's Bend Iron Company, Brady's Bend, Armstrong county. Four stacks, built from 1842 to 1845; dismantled in 1878-9.
- Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871-2; torn down in 1872.
- Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, built in 1869, enlarged in 1879.
- Juniata Furnace, James M. Kinkead, Williamsburg, Blair county. One stack, built in 1857.
- Lawrence Furnace, Foltz & Jordan, New Castle, Lawrence county. Built in 1846; fuel, coke and charcoal; abandoned in 1873.
- Little Pet Furnace, New Castle, Lawrence county. One stack, built in 1853; has not been in blast for a number of years.
- Mahoning Furnace, Mahoning Furnace P. O., Armstrong county. One stack, built in 1845. Dismantled in 1886.
- Middlesex Furnace, West Middlesex, Mercer county. Built about 1855; abandoned in 1875.
- Monticello Furnace, William Acheson, Monticello, Armstrong county. Built in 1859; abandoned in 1876.
- Pine Creek Furnace, Brown & Mosgrove, Kittanning, Armstrong county. Built in 1846; abandoned and dismantled in 1879.
- Rodman Furnaces, Duncan Heirs, Roaring Springs, Blair county. Two stacks, built in 1846, and rebuilt in 1879-80.
- Sligo Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1845; abandoned in 1873.
- Stewardson Furnace, F. B. & A. Laughlin, Mahoning, Armstrong county. One stack, built in 1848-9.
- Wampum Furnace, Wampum, Lawrence county. One stack, built in 1856. Has been idle since 1883.
- Wheatland Furnaces, Wheatland, Mercer county. Four stacks, built from 1860 to 1865. Out of blast since September, 1875.

## CHARCOAL.

- Augusta Furnace, Harrisburg and Potomac Railroad Company, Newville, Cumberland county. Furnace near Shippensburg.
- Barree Furnace, Barree Forge P. O., Huntingdon county. One stack, built in 1863. Not in blast for several years.

- Big Pond Furnace, Newville, Cumberland county. Built in 1836; burned in 1880.
- Forest Iron Works, White Deer Mills, Union county. Built in 1846.
- Franklin Furnace, Hunter & Springer, Edenville, Franklin county. One stack, built in 1828.
- Hampton Furnace, E. and G. Brooke Iron Company, Birdsboro, Berks county. One stack, built in 1846, and rebuilt in 1872.
- Hopewell Furnace, James Eichelberger & Co., Hopewell, Bedford county. One stack, built in 1800.
- Laura Furnace, Millerstown, Perry county. Built in 1873.
- Madison Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1836; abandoned in 1874.
- Manada Furnace, Grubbs & Bland, Swatara Station, Dauphin county. Built in 1836; abandoned in 1874.
- Mount Etna Furnace, Samuel Isett, Yellow Springs, Blair county. One stack, built in 1808, and rebuilt in 1850. Not in blast since 1877.
- Mount Hope Furnace, C. B. Grubb, Mount Hope, Lancaster county. One stack, built in 1784.
- Mount Penn Furnace, William M. Kaufman & Co., Reading, Berks county. One stack, built in 1830; abandoned in 1883.
- Rebecca Furnace, Mrs. Elizabeth S. Lytle, Martinsburg, Blair county. One stack, built in 1817, and rebuilt in 1839.
- Rockhill Furnace, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Built in 1830; abandoned in 1873.
- Rockland Furnace, Berks county. Built in 1791, rebuilt in 1879, and burned in 1881. Formerly called Sally Ann Furnace.
- Sarah Furnace, Sarah, Blair county. Built in 1824; idle since 1874.
- Springfield Furnace, estate of John Royer, Williamsburg, Blair county. One stack, built in 1814. Made its last blast in 1885.
- Spring Hill Furnace, Fairchance Furnace Company, Smithfield, Fayette county. One stack, built in 1805; dismantled in 1883.
- York Furnace, York county. Built in 1830; made its last blast in 1874.

## GAS.

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

## MARYLAND.

## BITUMINOUS COAL AND COKE.

- Bowery Furnace, Cumberland Coal and Iron Company, Frostburg, Alleghany county. One stack, built in 1868, and rebuilt in 1873; dismantled in 1883.
- Elk Ridge Furnace, Elk Ridge Landing, Howard county. Rebuilt in 1855; not in blast since 1874.
- Knoxville Furnace, Knoxville, Frederick county. Built in 1837; not in blast since 1874. Formerly called Longacoming Furnace.

## CHARCOAL.

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

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

## VIRGINIA.

## COKE.

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

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

## CHARCOAL.

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

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

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

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

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

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

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

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

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

## NORTH CAROLINA.

## CHARCOAL.

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

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

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

## GEORGIA.

## CHARCOAL.

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

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

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

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

## COKE.

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

## ALABAMA.

## CHARCOAL.

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

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

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

## WEST VIRGINIA.

## CHARCOAL.

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

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

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

## COKE.

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

## KENTUCKY.

## CHARCOAL.

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

Buena Vista Furnace, Means & Co., Ashland, Boyd county. Built in 1848; dismantled in 1876.

Buffalo Furnace, Argillite, Greenup county. One stack, built in 1851; not in blast since 1875.

Charlotte Furnace, Grayson, Carter county. One stack, built in 1873.

- Cottage Furnace, Joel McKinney, Union Hall, Estill county. One stack, built in 1855.
- Hematite Furnace, Trigg county. Formerly called Centre Furnace. One stack, built in 1852.
- Kenton Furnace, Damarin & Co., Portsmouth, Ohio. Furnace in Greenup county. One stack, built in 1856.
- Laura Furnace, C. Beringer, 106 Fourth avenue, Pittsburgh, Pa. Works at Laura Furnace P. O., Trigg county. One stack, built in 1851.
- Laurel Furnace, Joshua Kelley, Riverton, Greenup county. One stack, built in 1849.
- Mount Savage Furnace, Carter County Mining and Manufacturing Company, Mount Savage, Carter county. One stack, built in 1848.
- Pennsylvania Furnace, Greenup county. Built in 1848; discontinued in 1881.
- Pine Grove Furnace, Spriggs & Sanders, Quincy, Lewis county. Furnace in Greenup county. One stack, built in 1881.
- Pioneer Furnace, Northup, Cummings & Peck, Louisa, Lawrence county. One stack, built in 1881.
- Raccoon Furnace, Raccoon Mining and Manufacturing Company, Greenup, Greenup county. One stack, built in 1831.
- Trigg Furnace, Trigg Furnace P. O., Trigg county. One stack, built in 1871. Has not been in blast since 1876.

## COKE.

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

## TENNESSEE.

## CHARCOAL.

- Brownsport Furnace, Brownsport Furnace P. O., Decatur county. One stack, built in 1850.
- Clark Furnace, La Grange Iron Company, Clark Furnace P. O., Stewart county. One stack, built in 1854, and burned and rebuilt in 1881.
- Dougherty's Furnace, Baker's Gap, Johnson county. Built in 1878; made but a short blast.
- Eagle Furnace, Riley Stone, Bristol, Sullivan county. Built in 1838; not in blast since 1875.
- Embreeville Furnace, Jonesboro, Washington county. Built in 1846; out of blast since 1874.
- Great Western Furnace, Dover, Stewart county. Built in 1854.
- Napier Furnace, Napier Iron Company, Chief P. O., Lawrence county. One stack, built in 1860.
- Pottsdale Furnace, Greeneville, Greene county. Built in 1862; out of blast since 1874.
- Rose and Crockett Iron Works, Cumberland Gap, Claiborne county. One stack, built in 1823.

- Rough and Ready Iron Works, Rough and Ready Furnace P. O., Stewart county. One stack, built in 1850, rebuilt in 1868.
- Speedwell Furnace, Speedwell, Claiborne county. Built in 1825.
- Sullivan County Furnace, Jenkins, Hodge & Co., Union Depot, Sullivan county. One stack, built in 1881, but operated for only a short time.
- Unaka Furnace, Unaka, Greene county. Built in 1868; out of blast since 1874.
- Vernon Furnace, Montgomery county. Built in 1833.
- Wayne Furnace, Wayne county. Built in 1856; out of blast since 1875.
- Worley Furnace, Dickson, Dickson county. Built in 1847; made a blast on coke in 1879.

## COKE.

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

## OHIO.

## CHARCOAL.

- Cambria Furnace, Samsonville, Jackson county. Built in 1854; out of blast since 1875.
- Clinton Furnace, Wheelersburg, Scioto county. Built in 1832; out of blast since 1873.
- Eagle Furnace, Eagle Iron Company, Oreton, Vinton county. One stack, built in 1852; abandoned in 1883.
- Etna Furnace, Ironton, Lawrence county. One stack, built in 1832. Abandoned in 1885.
- Gallia Furnace, Norton, Campbell & Co., Portsmouth, Scioto county. Furnace in Gallia county. Built in 1847; abandoned in 1883.
- Grant Furnace, W. D. Kelly & Sons, Ironton, Lawrence county. One stack, built in 1869; dismantled in 1883.
- Hope Furnace, Hope Furnace P. O., Vinton county. Formerly called Big Sand Furnace. One stack, built in 1854. Not in blast since 1874.
- Jackson Furnace, Union Iron Company, Portsmouth, Scioto county. Furnace in Jackson county. Built in 1839.
- Keystone Furnace, Bundy Iron and Coal Company, Keystone Furnace, Jackson county. One stack, built in 1849.
- Latrobe Furnace, Bundy Iron and Coal Company, Berlin X Roads, Jackson county. One stack, built in 1854.
- Logan Furnace, Logan Iron Company, Logan, Hocking county. One stack, built in 1852; abandoned in 1883.
- Manhattan Furnace, Toledo Iron Company, Toledo. Built in 1866.
- Maumee Furnace, Antwerp, Paulding county. Built in 1865; abandoned in 1886.
- Monitor Furnace, Petersburg, Lawrence county. One stack, built in 1868; abandoned in 1885.
- Monroe Furnace, Union Iron Company, Monroe Furnace P. O., Jackson county. One stack, built in 1856.
- Ohio Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. Furnace in Scioto county. Built in 1845; abandoned in 1881.

Richland Furnace, Richland, Vinton county. One stack, built in 1854. Not in blast for several years.

Union Furnace, B. C. & R. D. McManigal, Union Furnace P. O., Hocking county. One stack, built in 1853.

#### BITUMINOUS COAL AND COKE.

Ashland Furnace, Jonathan Warner, Mineral Ridge, Trumbull county. Built in 1859.

Eagle Furnace, Eagle Furnace Company, Youngstown, Mahoning county. Built in 1846. Not in blast for a number of years.

Glasgow-Port-Washington Iron and Coal Company Limited, Port Washington, Tuscarawas county. Two stacks, built in 1873-4. Machinery removed to Pittsburgh, Pa., in 1882.

Globe Furnace, Jackson, Jackson county. Built in 1872.

Massillon Furnace, Massillon, Stark county. Built in 1854; abandoned in 1880.

Morgan Furnace, Irondale, Jefferson county. Built in 1870.

Orange Furnace, Jackson, Jackson county. Built in 1864; out of blast since 1874.

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

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

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

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

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

### INDIANA.

#### BITUMINOUS COAL.

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

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

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

#### CHARCOAL.

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

### ILLINOIS.

#### BITUMINOUS COAL OR COKE.

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



## MICHIGAN.

## CHARCOAL.

- Bay Furnaces, Bay Furnace Company, Onota, Schoolcraft county. Two stacks: one built in 1870; the other built in 1872; burned in 1877.
- Carp River Furnace, Marquette. Built in 1872-3; burned in 1882.
- Escanaba Furnace, Escanaba, Delta county. Built in 1872-3; machinery removed in 1879 to the Edgar Thomson Steel Works, Pa.
- Excelsior Furnace, Carp River Iron Company, Marquette. Furnace at Ishpeming. Built in 1872, rebuilt in 1879. Idle for three years.
- Lawton Furnace, Michigan Central Iron Company, Lawton, Van Buren county. One stack, built in 1867. Not in blast since 1873.
- Michigan Iron Company, Clarksburgh, Marquette county. Two stacks: Greenwood, built in 1865; and Michigan, built in 1867.
- Morgan Iron Company, Morgan, Marquette county. Two stacks: Morgan, built in 1863; Champion, built in 1867, and burned in 1874.
- Munising Furnace, Munising, Schoolcraft county. Built in 1867.
- Pacific Furnace, Marquette Furnace Company, Marquette, Marquette county. One stack, built in 1868, rebuilt in 1873. Fuel, either charcoal or coke. Not in blast for five years.

## WISCONSIN.

## CHARCOAL.

- Iron Mountain Furnace, North Chicago Rolling Mill Company, Iron Mountain, Dodge county. One stack, built in 1865.
- Richland Furnace, Cazenovia, Richland county. Built in 1876, and torn down in 1879.

## MISSOURI.

## CHARCOAL.

- Hamilton Furnace, Sullivan, Franklin county. One stack, built in 1873.
- Irondale Furnace, Irondale, Washington county. Built in 1859.
- Iron Mountain Furnaces, St. Francois county. Two stacks, built in 1846 and 1854; not in blast for several years.
- Knotwell Furnace, Newburg, Phelps county. Owned by Richard Heckscher, Philadelphia. One stack, built in 1873-4.
- Maramec Iron Works, Phelps county. One stack, built in 1826.
- Moselle Furnace, Moselle, Franklin county. Built in 1867.
- Osage Furnace, Camden county. Built in 1873.
- Scotia Iron Furnace, Leesburg, Crawford county. Built in 1870; abandoned in 1879.

## UTAH TERRITORY.

## CHARCOAL.

- Iron Manufacturing Company of Utah, Iron City, Iron county. One stack, built in 1873, torn down in 1883.
- Ogden Iron Works, Ogden. One stack, begun in 1875 and completed in 1882.

## ROLLING MILLS AND STEEL WORKS.

NOTE.—In this list the names of establishments are given first, whenever they have distinctive names, followed by the names of owners and their post-office addresses. The telegraph address is given only when it is not the same as the post-office address. Where the kind of power is not mentioned steam-power will be understood. In describing establishments an attempt is made to enumerate only the characteristic rolling-mill or steel-works plant, omitting descriptions of engines and other machinery which are common to all. The dimensions of rolls given relate to their diameter, when not otherwise stated. This Association is not responsible for statements of capacity.

### MAINE.

Portland Rolling Mill, P. O. Box 1,386, Portland, Cumberland county.

Built in 1866; 4 double puddling furnaces, 4 ordinary heating furnaces, one Siemens heating furnace, and 3 trains of rolls (one 10 and two 18-inch); product, merchant bar iron, railroad spikes, and fish-plates; annual capacity, 13,000 net tons. Brands, "Standard" and "Forest City." C. R. Milliken, President; John W. Leavitt, Secretary and Treasurer; Samuel Peters, Superintendent.

Number of rolling mills in Maine: one.

### NEW HAMPSHIRE.

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

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

### MASSACHUSETTS.

Bay State Iron Works, Bay State Iron Company, 191 High st., Boston, Suffolk county. Works, corner First and I sts., South Boston. Puddle mill built in 1847, containing 16 double puddling furnaces and 2 trains of rolls, not now in running condition. Plate mill No. 1 built in 1863, containing 2 trains of rolls and 5 heating furnaces, not now in running

condition. Plate mill No. 2 built in 1873; 2 trains of 30-inch rolls, 5 heating furnaces, and one annealing furnace; product, steel plates, rolled for other parties who furnish the ingots; annual capacity, 8,500 net tons. B. C. Vose, Treasurer and General Manager. Other officers: John H. Reed, President; Silas H. Witherbee, Edward W. Hooper, F. Gordon Dexter, and Francis C. Welch, Directors. *See Furnaces in New York.*

Bay State Steel Company, George W. Gogin, General Manager, 191 High st., Boston. Works corner First and I sts., South Boston. One 7-gross-ton open-hearth steel furnace, first started in March, 1886; product, steel ingots, rolled into plates by the Bay State Iron Company; annual capacity, 3,200 net tons.

Bridgewater Iron Company, Bridgewater, Plymouth county. Built in 1785 and 1874; 5 scrap furnaces, 3 heating furnaces, 6 forge fires, 8 trains of rolls, and 10 hammers; product, bar iron, tack plate, sheet zinc and sheet copper, and iron and steel forgings; annual product of rolled iron, about 6,000 net tons. Nahum Stetson, Treasurer. *See Parker Mills.*

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

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

East Bridgewater Iron Company, Rogers & Sheldon, 81 Water st., Boston. Works at East Bridgewater, Plymouth county. Built in 1837; one double puddling furnace, 6 heating furnaces, 2 charcoal fires, one train of 16-inch rolls, 26 nail machines, and one hammer; steam and water power; product, cut nails, clinch nails, tack plate, and shovel plate; make a few steel nails; annual capacity, 40,000 kegs of nails and 1,200 net tons of tack plate.

Fall River Iron Works, Fall River Iron Works Company, Fall River, Bristol county. Built in 1822, and rebuilt in 1842; 9 double and 5 single puddling furnaces, 11 heating furnaces, 105 nail machines, 2 hammers, and nine trains of rolls (two 8, three 9, and four 18-inch); product, nails, hoops, bands, and merchant bar iron to 3 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, James C. Warr, lessee, Wareham, Plymouth county. Built in 1866; 6 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron, of all kinds and sizes; specialties, round, square, and flat iron, ovals, half ovals, half rounds, axle and axe iron, and shafting; daily capacity, 30 net tons.
- Globe Nail Company, Station A, Boston. Built in 1877; 2 heating furnaces and 2 trains of rolls (one 9 and one 12-inch); use Swedish iron; product, horse-nail plate, tack plate, and other special rolling; annual capacity, 5,000 net tons. Aretas Blood, President; E. H. Baker, Treasurer; W. B. Crocker, Secretary; W. H. H. Miner, Superintendent.
- Gosnold Mills, 566 Acushnet avenue, New Bedford, Bristol county. Built in 1856; 7 heating furnaces, 5 trains of rolls, (two 8, one 10, and two 18-inch,) and 10 nail machines; use best wrought scrap iron and charcoal ore blooms; product, hoops, bands, scrolls, tires, rods, chains of every description, horse-shoe and hame iron, and 3-penny fine nails; annual capacity, 4,500 net tons of rolled iron, 4,500 kegs of nails, and 250 net tons of chains. Brand, "Gosnold." Leading products are hoops and wire rods. George Wilson, President; John A. Bates, Secretary and Treasurer; Henry Howard, Superintendent. Selling agents for nails, Ely & Williams, New York.
- Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton, Norfolk county. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process; stock company formed in 1855; 4 double puddling and 5 heating furnaces, one busheling and 2 scrap furnaces, 8 hammers, and 3 trains of rolls (one 8, one 14, and one 19-inch); steam and water power; product, merchant bar iron, shapes, splice bars, track bolts, and railroad supplies; annual capacity, single turn, 6,000 net tons. Brands of bar iron, "Kinsley" and "G. K." Forge connected with the works for the production of car and locomotive forgings, wagon axles, etc.; also a foundry and a machine shop. Fred. L. Ames, President; Edw. R. Eager, Treasurer; Frank M. Ames, Agent.
- Mount Hope Iron Works, Somerset, Bristol county. Built in 1875; one 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. Also operate a machine shop, for building nail machines and flax and hemp dressing machinery. Job M. Leonard, Treasurer; Henry B. Leonard, Agent.
- Norway Steel and Iron Company, 23 Mason Building, Boston. Works at 363 Dorchester avenue, South Boston. Built in 1854; 2 double and 6 single puddling furnaces, 14 heating furnaces, 10 trains of rolls, (three 8, one 10, one 13, four 18, and one 30-inch,) three 10-gross-ton Siemens Martin open-hearth steel furnaces, and 3 hammers; steel products, ingots, slabs, blooms, billets, bars, rods, bands, boiler and other plates, machinery, spring, tire, toe-calk, and sleigh-shoe steel, and finished

compressed steel shafting; iron products, bars, rods, bands, tack plate, nail plate, strips, and shapes; total annual capacity, 27,000 net tons. Brands, "Benzon," "Vasa," "Malar," "Norway," "N. I. W.," a five-point star, S with a crown over it, and N with a crown over it. George P. King, President; Albert Geiger, Secretary and Treasurer; George H. Billings, Superintendent.

Old Colony Iron Company, Taunton, Bristol county. Works at Taunton and at Somerset. The Taunton Works were built in 1825; one single and 8 double puddling furnaces; 20 heating furnaces, 7 trains of rolls, and 5 hammers; steam and water power; product, tack plate and shovels. The Somerset Iron Works, at Somerset, were built in 1855; 7 double puddling furnaces, 6 heating furnaces, 70 nail machines, and two 12-inch trains of rolls; product, nails, shovel plate, nail machines, castings, mill machinery, hoisting engines, etc. Total annual capacity of rolled iron, 5,000 net tons; of nails, 110,000 kegs. O. A. Washburn, Jr., Agent and Treasurer.

Parker Mills, Bridgewater Iron Company, Bridgewater. Works at Wareham, Plymouth county. Built in 1815; 6 double puddling furnaces, 4 heating furnaces, 75 nail machines, 2 trains of rolls, and one hammer; water-power; product, nails. *See Bridgewater Iron Company.*

Reed Brothers' Rolling Mill and Tack and Nail Works, D. L. & F. S. Reed, Brockton, Plymouth county. Built in 1881-2 at Matfield, and removed to Brockton in 1886; one double puddling furnace, 4 heating furnaces, 2 trains of rolls, (16 and 20-inch,) and 54 cut nail and tack machines; product, tack plate, and cut nails and tacks; annual capacity, 1,000 net tons of tack plate and 22,000 kegs of nails.

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

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. Built about 1820, rebuilt in 1846; 6 double puddling furnaces, one scrap furnace, one Siemens gas and 4 coal heating furnaces, 3 trains of rolls, (one 18-inch muck, one 18-inch nail plate, and one 16-inch tack plate,) and 75 nail machines; steam and water power; annual capacity, 100,000 kegs of cut nails, 2,000 net tons of plate iron, and 500 net tons of washers. Make "combined iron and steel" nails. Horace P. Tobey, Treasurer.

Wareham Nail Company, South Wareham, Plymouth county. Built in 1836; 4 heating furnaces, 33 nail machines, and 2 trains of rolls; steam and water power; product, nails; annual capacity, 70,000 kegs. Edgar Robinson, owner.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Two mills: Quinsigamond Rolling Mill, built in 1846; 7 heating furnaces and 2 trains of rolls; product, iron and steel screw,

- rivet, and wire rods; annual capacity, 10,000 net tons. Steel works added in 1885; one 12-gross-ton Siemens-Martin open-hearth furnace; made first steel September 26, 1885. Grove Mill, built in 1868; 4 heating furnaces and 3 trains of rolls; product, patent continuous wire rods of long lengths and small size for telegraph and rope wire; annual capacity, 50,000 net tons. All rods drawn into wire. Philip L. Moen, President and Treasurer; Charles F. Washburn, Vice-President and Secretary; Charles H. Morgan, General Superintendent.
- Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester, erected in 1864; twelve 4-pot steel furnaces, 3 heating furnaces, one train of tire rolls, and one hammer; product, crucible steel car-wheel tires; annual capacity, 1,100 net tons. Brand, "Washburn Car-wheel." W. A. Healy, President; William H. Barnum, Vice-President and Manager; Salisbury Hyde, Secretary and Treasurer.
- Weymouth Iron Company, 134 Milk st., Boston. Works at East Weymouth, Norfolk county. Built in 1836; 6 double puddling furnaces, 5 heating furnaces, 75 nail machines, and 3 trains of rolls; steam and water power; product, iron and steel nails and spikes; annual capacity, 112,000 kegs. Isaac Pratt, Jr., President; Nahum Stetson, Secretary and Treasurer; Benjamin W. Bowen, Superintendent. Selling agent, Edmund T. Pratt, 134 Milk st., Boston.
- Worcester Steel Works, (formerly Washburn Iron Company,) P. O. Box 967, Worcester, Worcester county. Built in 1857, and remodeled in 1882 to roll steel rails. Two 4-gross-ton Bessemer converters built in 1884; first blow made June 2, 1884, and first steel rail June 11, 1884; 2 Siemens heating furnaces, 2 trains of rolls, one hammer, and one 12-gross-ton Siemens-Martin open-hearth steel furnace; first open-hearth steel made March 25, 1885; product, Bessemer steel rails, also wire billets, nail plate, and blooms; annual capacity, 50,000 net tons. The company also makes cast-iron car-wheels; annual capacity, 25,000 wheels. George M. Rice, President; M. J. P. McCafferty, Secretary; Edwin Gleason, Treasurer; Samuel D. Nye, Manager; William E. Colles, General Superintendent.
- Number of rolling mills and steel works in Massachusetts: 25. Of these 4 are open-hearth steel works, one is a crucible steel works, and one is a Bessemer steel works.

## RHODE ISLAND.

- Rhode Island Horse Shoe Works, Rhode Island Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Built in 1867, and rebuilt in 1874; 7 scrap and 5 heating furnaces, 8 trains of rolls, (five 8 and three 18-inch,) and 24 horse-shoe machines; product, bars for the horse-shoe machines; annual capacity, single turn, 14,500 net tons. Brand, "Perkins' United States Standard Horse and Mule Shoes." F. W. Carpenter, President; C. H. Perkins, General Manager; R. W. Comstock, Secretary.
- Number of rolling mills in Rhode Island: one.

## CONNECTICUT.

- Ætna Nut Company**, Southington, Hartford county. Built in 1872-3; 2 single puddling furnaces, 4 scrap and busheling furnaces, 3 heating furnaces, and 3 trains of rolls; product, squares, rounds, nut shapes, bolt rods, and butt iron; annual capacity, 5,500 net tons. R. A. Neal, President; Benjamin S. Porter, Secretary; George B. Finch, Treasurer.
- Birmingham Rolling Mill**, Peck, Stow, and Wilcox Company, Birmingham, New Haven county. Principal office at Southington. Salesroom, 27 Chambers st., New York. Built in 1843; 2 busheling furnaces, 3 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls; steam and water power; product, bar iron, nut and bolt rods, nuts, washers, lag screws, and machine and carriage bolts; annual capacity, 6,000 net tons. R. A. Neal, President; S. C. Wilcox, Vice-President; T. H. McKenzie, Secretary; Stephen Walkley, Treasurer; H. S. Gran- nis, Manager.
- Cold Spring Iron Works**, Mitchell Brothers, Norwich, New London county. Built in 1845; 4 heating furnaces and 2 trains of rolls (one 9 and one 20-inch); product, ovals, half ovals, half rounds, rods, grooves, and scrolls; annual capacity, 2,200 net tons.
- Collins Company**, Collinsville, Hartford county. Established in 1826; 2 scrap furnaces, 8 heating furnaces, one 18-inch train of rolls, one 12-inch train, 2 hammers, two 20-ton steel cementing furnaces, and 30 steel-melting holes; 180 pots can be used at each turn in steel works; water and steam power; product, bar iron and cast steel, consumed wholly in these works in the production of "Collins" edge tools, steel plows, etc.; annual capacity of finished iron, 2,500 net tons, and of steel, 750 net tons. Edward H. Sears, President; Meigs H. Whaples, Secretary and Treasurer; Charles H. Blair, Superintendent. Treasurer's and transfer office, Hartford. General selling agents, Collins & Co., 212 Water st., New York.
- Farist (The) Steel Company**, Bridgeport, Fairfield county. Built in 1868; 2 single puddling and 4 heating furnaces, 2 trains of rolls, (one 12 and one 15-inch,) 6 hammers, and 18 four-pot steel-melting holes; product, cast steel, rolled and hammered; annual capacity, 1,800 net tons. Added in 1883 a spring shop, containing machinery for the manufacture of spiral springs and elliptic railroad springs. Joel Farist, President; George Windsor, Secretary; John B. Windsor, Treasurer.
- New Haven Rolling Mill**, New Haven Rolling Mill Company, New Haven. Completed in August, 1871; 10 charcoal forge fires, 6 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and one hammer; use only scrap iron; product, small nut and bolt rods and refined and charcoal wire rods; annual capacity, 5,000 net tons. H. M. Welch, President; E. S. Wheeler, Secretary; Pierce N. Welch, Treasurer; C. S. Poronto, Superintendent.
- Thames Iron Works**, Norwich, New London county. Built in 1863; 4



double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron and spike rods; annual capacity, 3,000 net tons. John Mitchell, President; James Greenwood, Secretary and Treasurer; Charles Mitchell, Superintendent.

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

Number of rolling mills and steel works in Connecticut: 8, of which 3 are crucible steel works.

## NEW YORK.

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

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

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

Chrome Steel Works, corner Kent Avenue and Keap st., Brooklyn, E. D., Kings county. Built in 1869; 7 heating furnaces, 7 hammers, 24 steel-melting holes, and 2 trains of rolls (one 12 and one 18-inch); 96 pots can be used at each heat in steel works; product, tool steel and burglar-proof welded steel and iron for safes, jails, etc.; annual capacity, 2,000 net tons. S. H. Kohn, Proprietor; C. P. Haughian, Superintendent.

Cohoes Rolling Mill, Morrison, Colwell & Page, 253 River st., Troy. Works at Cohoes, Albany county. Built in 1864; burned and rebuilt in 1883; 12 double puddling furnaces, 3 scrap and 4 heating furnaces, and 4 trains of rolls; water-power; product, band iron, bar

iron, and patent punched axe-polls; specialty, high-grade iron for edge tools and butts and hinges; annual capacity, 9,000 net tons.

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

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

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

Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Built in 1862-3; 48 two-pot steel-melting holes, 4 heating furnaces, one train of rolls, and one hammer; product, saw cast steel; annual capacity, 2,500 net tons. William Clemson, President; William Millsbaugh, Vice-President; W. K. Stansbury, Secretary; Charles I. Humphrey, Treasurer.

Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse, Onondaga county. Built in 1864; 11 heating furnaces, 6 hammers, (from 200 to 2,000 pounds each,) 5 trains of rolls, (two 9, one 10, and two 12-inch,) and 5 steel-cementing furnaces; manipulators of old Bessemer steel rails and locomotive tires, and converters of iron into blister steel; product, bar steel, steel crow-bars, seat springs, tire and spring steel, and steel for various other purposes; annual capacity, 6,000 net tons. Special products, "Sweet's Excelsior" tire steel, "Sweet's" seat springs, and "Sweet's" steel crow-bars. William A. Sweet, President and Manager; Matthew Cunningham, Secretary; Alfred Wilkinson, Jr., Treasurer; Peter Eckel, Superintendent. Agents, Parkhurst & Wilkinson, Chicago.

Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 3 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one hammer; use scrap iron only; product, merchant bar of all sizes and

- shapes, used by the firm in the manufacture of agricultural machinery; annual capacity, 4,500 net tons. D. M. Osborne, President; J. H. Osborne, Secretary; G. W. Allen, Treasurer.
- Phoenix Horse Shoe Company, Poughkeepsie. Built in 1873; 6 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; specialty, horse shoes; annual capacity, 8,000 net tons. Charles Miller, President and Manager; Charles H. Holton, Secretary and Treasurer.
- Port Henry Steel and Iron Company Limited, Port Henry, Essex county. Main office, 33 Broad st., New York City. Clapp-Griffiths steel plant built in 1885-6; one 3-gross-ton converter; made its first blow February 16, 1886; added to a blast-furnace plant; product, steel ingots for the general market. *See Furnaces.*
- Rome Merchant-Iron Mill, Rome, Oneida county. Built in 1869; 6 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best grades of merchant bar, horse-shoe, hexagon and beveled-edge tire, scroll, hoop, and band iron, branded "Rome," and a superior quality from charcoal pig branded "J. G.;" annual capacity, 10,000 net tons. Jim Stevens, President; B. J. Beach, Vice-President; Charles W. Lee, Secretary and Treasurer; Samuel Southall, Superintendent; J. Hildreth, Agent.
- Sable Iron Works, J. and J. Rogers Iron Company, Ausable Forks, Essex county. Built in 1834; operated in connection with a forge; 2 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); water-power; product, bars for conversion into cast steel, Peru horse-shoe iron, and round and square iron; annual capacity, 7,000 net tons. Brands, "Peru iron," "Rogers," or R in a circle. H. D. Graves, President; H. W. Stetson, Vice-President; Benjamin E. Wells, Secretary. *See Forges.*
- Sanderson Brothers Steel Company, Syracuse, Onondaga county. Established in 1876; 5 heating furnaces, 8 hammers, 2 forge fires, 3 trains of rolls, (9, 10, and 12-inch,) 2 steel-cementing furnaces, and one 16-pot and four 12-pot Siemens steel-melting furnaces; use clay pots made by the company; product, bar cast steel; annual capacity, 2,400 net tons. Brand, "Sanderson Bros. & Co." Makers of the genuine Sanderson best cast steel. Lucius Gleason, President; William W. Teall, Secretary and Treasurer; C. H. Halcomb, General Manager.
- Spuyten Duyvil Rolling Mill, Welch & Barnum, Spuyten Duyvil, New York City. Main office, 11 Pine st., New York City. Rail mill built in 1863; 4 double puddling and 10 heating furnaces and 2 trains of 3-high 18-inch rolls. Bar and guide mill added in 1872; 3 heating furnaces and 2 trains of rolls (one 9 and one 16-inch). Product, rails, fish-plates, and all sizes of merchant and guide mill iron; annual capacity, 20,000 net tons. J. T. Lewis, Superintendent.
- Star Iron Works, Bowen & Signor, Saranac, Clinton county. Built in 1878; 2 trains of rolls, operated in connection with a forge; product, nail rods, bolt and rivet rods, bars for crucible steel, etc. *See Forges.*
- Syracuse Iron Works, Syracuse, Onondaga county. Built in 1861; 5

double and 2 double-double puddling furnaces, 6 heating furnaces, 3 trains of rolls, (one 8, one 9, and one 19-inch,) and 2 hammers; product, best grades of merchant bar, wire-rod, band, and hoop iron, railroad and boat spikes, fish bolts, horse-shoe and bridge iron, horse shoes, and cotton-ties; annual capacity, 10,000 net tons. Brand, "S. I. W." A superior-quality of iron from charcoal pig is branded "E. B. B." Works in the hands of a receiver in 1886, and idle.

Troy Steel and Iron Company, Troy, Rensselaer county. New York office, 11 Pine st. Property formerly owned by the Albany and Rensselaer Iron and Steel Company. Albany Iron Works, established in 1819; 7 double and 14 single puddling furnaces, 23 heating furnaces, 7 trains of rolls, 4 steam and 2 trip hammers, and 33 nail, 2 bolt, 6 rivet, and 2 nut machines; steam and water power; product, bars, angles, car axles, bands, hoops, finger-bars, crow-bars, boat spikes, fish-plates, bolts and nuts, cut nails, and boiler rivets; annual capacity, 37,000 net tons. Brands of iron, "A. I. W.," "Corning's Best Best," and "Troy." Rensselaer Iron Works, established in 1846; three-high steel rail mill and merchant mill built in 1866 and 1867; first steel rail rolled in 1866; new merchant mill built in 1877 and 1878; 23 heating furnaces, 5 trains of rolls, and 2 steam and 2 trip hammers; product, steel rails, steel shapes and sheets, and special and agricultural steels; annual capacity of rail mill, 120,000 net tons; capacity of merchant mill, 25,000 tons. Brands of steel, "XX Gun," "XX Special Dead Soft," and "XX Gun Barrel," besides a variety of other special grades. Bessemer Steel Works built in 1864; made their first blow February 16, 1865; 2 converters, each of 10 gross tons capacity; 4 cupolas and 4 spiegel cupolas; annual capacity, 300,000 net tons ingots; blooming department contains 5 heating furnaces and an adjustable train of 31½-inch rolls; capacity to roll full product of converting department; steam-power, with auxiliary water-wheel. Chester Griswold, President; Erastus Corning, Vice-President; Selden E. Marvin, Secretary and Treasurer; Robert W. Hunt, General Superintendent. *See Furnaces.*

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

Union Iron Works, Buffalo, Erie county. Built for an iron rail mill in 1862; 16 double puddling and 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. Owned by Lehigh Valley Railroad Company, E. P. Wilbur, President, Bethlehem, Pa. Idle in 1886.

Westerman Rolling Mill, Westerman & Co., Lockport, Niagara county. Built in 1870; one puddling furnace, 3 heating furnaces, and 2 trains of rolls; water-power; product, hoops, bands, wire rods, horse-shoe

iron, rounds, squares, hexagons, and fancy shapes; annual capacity, 4,000 net tons.

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

Number of rolling mills and steel works in New York: 25. Of these one is a Bessemer steel works, 4 are crucible steel works, one makes open-hearth steel, one makes Clapp-Griffiths steel, and one makes blister steel.

## NEW JERSEY.

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

Boonton Iron Works, Estate of J. Couper Lord, John S. Schultze, General Manager, 59 Wall st., New York. Works at Boonton, Morris county. Built originally in 1825 and extended since; 12 double puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 134 nail and spike machines; steam and water power; product, nails, spikes, nuts, and washers; annual capacity, 300,000 kegs of cut nails and spikes. (One of the nail factories is at present leased and operated by Patterson, Anthony & Grubb, who make iron and steel nails for Fuller Bros. & Co., 139 Greenwich st., New York, from nail plate furnished by the latter.) *See Furnaces.*

Cumberland Nail and Iron Company, Bridgeton, Cumberland county. Branch office, 43 North Water st., Philadelphia. Built in 1814; 10 double puddling furnaces, 4 heating furnaces, two 18-inch trains of rolls, and 84 nail machines; steam and water power; product, nails and gas tubes; annual capacity, 140,000 kegs of cut nails and 3,000 net tons of gas tubes. Robert J. Buck, President; Chester J. Buck, Vice-President; John M. Reeves, Secretary and Treasurer, 43 North Water st., Philadelphia. Agents for the sale of gas tubes, Getze & Reeves, 7 and 9 North Fifth st., Philadelphia.

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

Dover Iron Works, Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770, and rebuilt several times since; 4 double

- puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); steam and water power; product, merchant bar, boiler rivets, socket bolts, and brace jaws; annual capacity, 3,500 net tons. Brand of merchant bar, "Dover;" brand of rivets, "D." George Richards, President; H. W. Crabbe, Secretary and Treasurer. Represented in New York by Fuller Bros. & Co., 139 Greenwich st.
- Heller & Brothers, Newark, Essex county. Crucible steel works, built in 1882; 24 two-pot steel-melting holes; product, crucible steel, used by the firm in the manufacture of tools, rasps, and files; annual capacity, 1,000 net tons.
- Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City, Hudson county. Built in 1850; 2 heating furnaces and one 10-inch train of rolls; use scrap iron only; product, spikes, splice joints, bolts, rivets, and round, flat, and square bar iron; annual capacity, 8,500 net tons.
- Jersey City Steel Works, Jersey City Steel Company, Jersey City. Commenced operations August 1, 1862; 2 single and 2 double puddling furnaces, 22 heating furnaces, 5 trains of rolls, (two 9, one 12, one 16, and one 18-inch,) 12 steam hammers, and 80 four-pot steel-melting holes; product, cast steel solely; annual capacity, 14,000 net tons. James R. Thompson, President; B. Illingworth, Vice-President; D. G. Gautier, Secretary and Treasurer.
- John A. Roebling's Sons Company, Trenton. Old mill built in 1852, new mill in 1873; 8 charcoal forge fires, 5 heating furnaces, 4 trains of rolls, and one 3-ton steam hammer; product, wire rope and merchant rods; annual capacity, 9,000 net tons. These works have not been in operation since August, 1883, but the wire and wire-rope works connected with them have been and are in full operation. Charles G. Roebling, President; F. W. Roebling, Secretary and Treasurer.
- Newark Steel Works, Benjamin Atha & Co., Newark, Essex county. Began business in 1864; one double puddling furnace, 36 four-pot steel-melting holes, one 7-gross-ton Siemens open-hearth steel furnace, 12 steam hammers, and 5 trains of rolls (two 8, one 9, one 12, and one 16-inch); product, every kind of cast steel, except sheet; total annual capacity, 14,000 net tons. Brand, "Newark."
- Oxford Iron and Nail Company, Oxford, Warren county. New York office, 52 Wall st. Built in 1866; 26 puddling furnaces, 5 heating furnaces, 4 spike furnaces, 103 nail machines, and 4 trains of rolls (one 10, one 12, and two 23-inch); product, nails; annual capacity, 300,000 kegs. Theodore Sturges, President; John I. Blair, Vice-President; Charles E. Sturges, Treasurer; Edmund T. Lukens, Secretary and General Manager, at the works. Sales agent, J. S. Scranton, 83 Washington st., New York. See *Furnaces*.
- Passaic Rolling Mills, Passaic Rolling Mill Company, Paterson, Passaic county. New York office, Room 45, Astor House. Built in 1867, and incorporated in 1869; 8 double puddling furnaces, 6 heating furnaces, 5 trains of rolls, (one 9, one 18, one 20, and one 26-inch, and one 30-



inch universal,) and 3 hammers; product, beams, channels, angles, tees, and other shapes for buildings and bridges, merchant bars, rivets, nuts, etc.; annual capacity, 20,000 net tons. Specialty, shapes. Brand, "Passaic." Watts Cooke, President; W. O. Fayerweather, Vice-President and Treasurer; A. C. Fairchild, Secretary; John K. Cooke, Superintendent. The company are also bridge builders and contractors; annual capacity of bridge shop, 12,000 net tons.

Pompton Steel and Iron Company, Pompton, Passaic county. Built in 1863; 5 single puddling furnaces, 6 heating furnaces, 42 crucible steel-melting furnaces, 2 trains of rolls, and 5 hammers; water and steam power; 160 pots can be used at each heat in steel works; product, crucible cast steel and railway car springs; annual capacity, 3,000 net tons. James Ludlum, President and Treasurer; Richard Wright, Secretary; Joseph W. McElroy, Superintendent.

Powerville Iron Works, B. O'Day, lessee, Lock Box 394, Boonton, Morris county. Works at Powerville, Morris county. Main office and store, 543 Washington st., New York. Built in 1845; 2 heating furnaces and 2 trains of rolls (one 8 and one 16-inch); water-power; product, horse-shoe and tire iron, made from scrap; annual capacity, 2,000 net tons. Brand, "P. I. W."

Rockaway Direct Process Iron and Steel Company, Rockaway, Morris county. First put in operation in May, 1886; 3 single puddling furnaces, one Wilson deoxidizer, one 20-inch train of rolls, and one hammer; steam and water power; product, blooms for steel purposes, made directly from ore. *See Forges.*

Trenton Iron Company, Trenton, Mercer county. Built in 1845; 11 forge fires, 2 double puddling furnaces, 6 heating furnaces, 2 hammers, (one 2½ and one 3-ton,) and 4 trains of rolls (one 8, one 10, one 12, and one 20-inch); wire works, with 897 blocks; product, wire rods, merchant rods, and iron and steel wire; annual capacity of rods, 13,500 net tons. Building steel works in 1886, to contain a small Bessemer converter. Abram S. Hewitt, President; William Hewitt, Vice-President; James Hall, Treasurer; E. Hanson, Secretary. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Philadelphia office, 21 North Fourth st.

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



West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City, Hudson county. Telegraph address, West Bergen. Built in 1880; 16 heating furnaces, 4 trains of rolls, (9, 10, 12, and 18-inch,) 5 hammers, and 24 four-pot steel-melting holes; product, crucible cast steel; also re-roll Bessemer and open-hearth steel billets; annual capacity, 5,000 net tons.

Number of rolling mills and steel works in New Jersey: 18. Of these 5 are crucible steel works, one is an open-hearth steel works, and one small Bessemer plant is in course of erection.

## PROJECTED.

Columbia Rolling Mill Company, Jersey City. Product, thin sheets.

## PENNSYLVANIA.

## PHILADELPHIA AND VICINITY.

Delaware Rolling Mills, Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Built in 1870; 10 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls; product, bar iron specialties; annual capacity, 15,000 net tons. Brands, "H. & P. Best," "H. & P. Best-Best," and "H. & P. Stay-bolt."

Fair Hill Forge and Rolling Mill, Gaulbert, McFadden & Caskey, York and America sts., Philadelphia. Built in 1854; 2 single and 2 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, and one hammer; product, merchant bar; annual capacity, 7,500 net tons. Ishmael James, Superintendent.

Fairmount Steel Works, Alexander Foster & Co., 2,325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot steel-melting furnaces, and 3 steam hammers; product, frog plates and points, all kinds of steel forgings, and best American cast steel, suitable for shear knives, dies, taps, cold chisels, and lathe tools; annual capacity, 482 net tons.

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

Gray's Ferry Iron Works, Edward S. Buckley, 209 South Third st., Philadelphia. Built in 1858 by the present owner; 3 double puddling furnaces, 4 charcoal forge fires, 3 heating furnaces, 2 trains of rolls, and 2 hammers; product, plate iron of all kinds and charcoal blooms; annual capacity, 4,800 net tons plates and 600 tons blooms. *See Charcoal Furnaces.*

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Built in 1845; 9 double puddling furnaces, one scrap and 7 heating furnaces, 7 trains of rolls, and 41 nail machines; product, nails, merchant bar, band, hoop, and skelp

iron, and steel plow, cultivator, and shovel plate; annual capacity, 11,000 net tons. Brand, "Anvil."

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

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Tacony, Philadelphia. The manufacture of saws started in 1840, and the manufacture of steel in 1854; two 24-pot Siemens steel-melting furnaces, and 20 two-pot and 3 four-pot coal furnaces; first rolling mill built in 1866; 2 forge fires, 4 trains of rolls, (two 16-inch sheet, one 20-inch sheet, and one 28-inch plate,) 13 heating furnaces, and one hammer; product, principally saw steel of every description; also, steel for engravers' plates and sheet steel of all kinds; annual capacity, 4,836 net tons. The steel works were originally built at Philadelphia, and were removed to Tacony in 1879, 1881, and 1883. Brand, "Disston." S. T. Williams, Manager; Samuel Disston, Sales Agent.

Midvale Steel Company, Nicetown, Philadelphia. Branch office, 333 Walnut st., Philadelphia. Built in 1866; one 15-gross-ton, one 12-ton, and one 7-ton Siemens open-hearth steel furnace, 12 four-pot steel-melting coal fires, 20 bituminous and 8 anthracite gas producer fires, 12 coal and 6 gas heating furnaces, 9 hammers, (two 9 tons to 300 pounds,) one tire mill with monthly capacity of 3,000 tires, and 2 trains of rolls (one 12 and one 23-inch). A well-equipped machine shop attached, as well as blacksmith, moulding, and annealing shops. Product, open-hearth and crucible steel, consisting of locomotive tires, axles, miscellaneous forgings, and castings; tool, file, spring, machinery, and frog steel, and rolled steel shapes; also forgings and castings for ordnance purposes. Special attention paid to forgings and castings required to stand severe physical tests. Daily capacity, 75 net tons; annual capacity, 15,000 net tons. William Sellers, President; Marriott C. Smyth, Secretary and Treasurer; R. W. Davenport, Superintendent.

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

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; one single and 16 double puddling furnaces, 13 heating furnaces, and 5 trains of rolls (one 12, one 18, two 20, and one 23-inch); product, all shapes in either iron or steel, channel bars from 2 to 15 inches, beams from 3 to 15 inches, deck beams from 5 to 12 inches, tees, angle iron from 1 to 6 inches, hammered and rolled axles, bar and bridge iron, and shafting from 1 to 7 inches; the forge has 3 hammers; annual capacity, 30,000 net tons. Specialties, structural shapes, axles, shafting, and bridge iron. Brand, "Pencoyd." Two 15-gross-ton open-hearth steel furnaces in course of erection.

Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Works at 1215 Beach st. Built in 1856; 7 single puddling furnaces, 5 heating furnaces, and 4 trains of sheet rolls; product, sheet iron; annual capacity, 7,500 net tons. Brands, "Penn Treaty," "Keystone," and "Ironsides."

Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Built in 1858; 8 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (two 9, one 17, and one 22-inch); product, plates, skelp, bands, hoops, bars, and rods; annual capacity, 12,000 net tons. Brand, "S. R. Best." *See Schuylkill Valley Furnaces.*

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

Number of rolling mills and steel works in Philadelphia and vicinity: 14. Of these 5 are crucible steel works, one is an open-hearth steel works, and one open-hearth steel plant is building.

#### EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

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

Bethlehem Iron Company, Bethlehem, Northampton county. Established in 1863. Rolling mills started in 1863; one single, 4 double, and 3 double-double puddling furnaces, 18 heating furnaces, 45 gas producers, 9 trains of rolls, (10, 12, 15, 21, 22, 25, 28, 32, and 48-inch,) and 5 hammers, ranging from one to 7 tons each; product, iron and steel rails, billets, beams, tees, angles, heavy plates, etc. Bessemer steel works started in 1873; four 7-gross-ton and one 1-ton Bessemer

steel converters; first blow made October 4, 1873; first steel rail rolled October 18, 1873; 8 iron cupolas and four spiegel cupolas; 4 soaking pits; product, ingots for rails, etc., and light and heavy castings. In advanced stage of construction: Pernot open-hearth steel plant, consisting of two 15-gross-ton furnaces, one 15-gross-ton pre-heating furnace, 2 hydraulic hoists, cranes, etc. Machine shop, blacksmith shop, and foundry connected with the works. Robert H. Sayre, General Manager; Alfred Hunt, President; William W. Thurston, Vice-President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; John Fritz, Chief Engineer and General Superintendent. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 2 single and 11 double puddling furnaces, 2 scrap and 4 heating furnaces, 113 nail machines, and 2 trains of rolls; steam and water power; product, nails; annual capacity, 250,000 kegs. Brand, "Anchor." Bessemer department contains two small tilting converters; first blow made September 21, 1885; annual capacity, 20,000 net tons of ingots. George Brooke, President; R. T. Leaf, Secretary; George W. Harrison, Treasurer; Elisha Brown, Superintendent. *See Schuylkill Valley Furnaces.*

Blandon Iron Works, Maidencreek Iron Company, Blandon, Berks county. Office, 544½ Court st., Reading, Pa. Built in 1867; 10 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, round, square, flat, hoop, band, and skelp iron; annual capacity, 8,000 net tons. Z. H. Maurer, Treasurer.

Brandywine Rolling Mills, Worth Brothers, Coatesville, Chester county. Built in 1881-2, and put in operation in February, 1882; 3 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (20 and 28-inch); product, plate iron and muck bar; annual capacity, 6,000 net tons of plate iron.

Bristol and Hamburg Rolling Mills, Nevegold, Scheide & Co., Bristol, Bucks county. Two mills: Bristol Rolling Mill, at Bristol, built in 1875-6; 2 heating furnaces, 2 trains of rolls, (one 8 and one 12-inch,) and one "continuous" hoop train. Hamburg Rolling Mill, at Hamburg, Berks county, built in 1865; 7 double puddling furnaces, one cupola furnace, 2 heating furnaces, one 3-ton hammer, and 2 trains of rolls (10 and 18-inch). Product, bar, band, hoop, and scroll iron, and muck and scrap bars. Total annual capacity, 10,000 net tons of finished iron. Brand, "Bristol Mills."

Carbon Rolling Mill Company Limited, Mauch Chunk. Works at Weissport, Carbon county. Built in 1860-4, and rebuilt in 1872; one single and 4 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (8, 10, and 16-inch); product, round, square, flat, and oval bar iron; annual capacity, 8,000 net tons. William Lilly, Chairman; J. M. Dreisbach, Secretary and Treasurer. Idle and for sale.

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Company organized in 1864. Two mills: Catasauqua Mill at Catasauqua

- and Ferndale Mill at Ferndale; 30 single puddling furnaces, 12 heating furnaces, 9 trains of rolls, (one 8, two 10, one 15, three 18, one 21-inch, and one 22-inch plate train,) and one 10-ton hammer; product, highest grades of bar, tank, and boiler iron, bands, shapes, rolled car axles, angles, skelp iron, steel boiler plate, steel angles, steel shafting, and merchant bar steel; annual capacity, 30,000 net tons. Specialty, rolled fibrous steel railway car axles, stronger than iron, more reliable than steel. Brands of iron, "Catasauqua," "Catasauqua Refined," "Catasauqua Rivet," and "Catasauqua Stay-bolt;" brand of steel, "Catasauqua Fibrous Steel." Oliver Williams, President; John Williams, Secretary; Henry Davis, Treasurer; W. P. Hopkins, Superintendent, Catasauqua; Edward Edwards, Superintendent, Ferndale. Selling agents: Justice Cox, Jr., & Co., 224 South Fourth st., Philadelphia; E. T. Day, 95 Liberty st., New York.
- Chester Rolling Mills, Thurlow, Delaware county. Telegraph address, Chester. Built in 1874-5; 11 double puddling furnaces, 5 heating furnaces, (of which 2 are Siemens heating furnaces,) one hammer, and 4 trains of rolls; product, tank, ship, bridge, and boiler plate iron; annual capacity, 12,000 net tons. Open-hearth steel plant added in 1881-2, consisting of two 15-gross-ton Siemens furnaces; annual capacity, 22,500 net tons of ingots, worked into plates. S. A. Crozer, President; S. A. Crozer, Jr., Secretary; C. B. Houston, Treasurer; T. J. Houston, General Manager. Philadelphia office, 238 South Third st. *See Schuylkill Valley Furnaces.*
- Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Built in 1871; 2 cupolas and 8 annealing furnaces; product, steel castings. E. P. Dwight, President and Treasurer; A. G. Lorenz, Secretary; J. J. Deemer, Superintendent.
- Coatesville Iron Works, W. J. Carmichael, Manager, Coatesville, Chester county. Built in 1838; 4 double and 3 single puddling and 6 heating furnaces, 4 trains of rolls, and one hammer; steam and water power; product, iron and steel boiler plate and flue iron; annual capacity, 11,000 net tons. Formerly called Viaduct Iron Works. Brand, "Viaduct." Proprietor, Andrew Williams, Plattsburgh, N. Y. *See Laurel Iron Works.*
- Combination Steel and Iron Company, Chester, Delaware county. Built in 1881; 8 heating furnaces, 3 trains of rolls, (12, 20, and 22-inch,) and 3 rivet machines; product, bars, angles, rails, rivets, and bolts; annual capacity, 20,000 net tons. John Roach, President; G. E. Weed, Treasurer; C. A. Weed, General Manager.
- Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. Office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; rebuilt in 1882-3; 7 double puddling furnaces, 7 heating furnaces, and seven 20-inch trains of rolls; steam and water power; product, sheet, flue, and plate iron of all kinds; annual capacity, 7,000 net tons. Brands, "Anchor," "Hope," and "R. G." John Wood,

- President; George W. Wood, Vice-President and Superintendent; Charles M. Wood, Secretary; William M. Wood, Treasurer.
- Easton Sheet Iron Works, Reilly & Oliver, Easton, Northampton county. Started February 1, 1872; one double and one single puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and one train of 22-inch rolls; product, bloom and refined sheet iron; annual capacity, 1,000 net tons. Selling agents, Marshall Lefferts & Co., 90 Beekman st., New York.
- Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Built in 1884-5; 6 double puddling furnaces, 2 gas heating furnaces, one 22-inch train of rolls, and 100 nail machines; product, "Keystone" iron and steel nails; annual capacity, 200,000 kegs. G. B. Lessig, Chairman; W. S. Ellis, Treasurer; J. B. Lessig, Secretary.
- Eureka Cast Steel Company, 307 Walnut st., Philadelphia. Works at Lamokin, one mile south of Chester, Delaware county. Built in 1877; product, steel castings of all kinds; specialty, steel propellers and railroad castings. John A. Emereck, President; William H. Dickson, Secretary and Treasurer.
- Gibraltar Iron Works, S. Seyfert & Co., Reading. Built in 1846, rebuilt in 1883-4; 2 heating furnaces and one 18-inch train of rolls; product, boiler plate and boiler tube and pipe iron; annual capacity, 3,000 net tons. *See Bloomeries.*
- Glasgow Iron Works, Glasgow Iron Company, Pottstown, Montgomery county. Works at Glasgow. Puddle mill built in 1874; 6 double puddling furnaces and one train of muck rolls; water-power. Plate mill added in March, 1876; steam-power; 3 heating furnaces and one train of rolls 96 inches long; annual capacity, 8,000 net tons of boiler plate. Steel plant built in 1885-6; two 3-gross-ton Clapp-Griffiths converters; made their first blow, May 11, 1886; one soaking pit; product, soft mild steel for boiler and fire-box plates; annual capacity, 50,000 net tons. Specialties, "S. B. F." and "S. B. F. B." Joseph L. Bailey, President; Comly B. Shoemaker, Treasurer; G. W. Nicolls, Secretary; Edward Bailey, General Manager; Samuel A. Bacon, Superintendent of steel works. Selling agents, J. W. Hoffman & Co., Philadelphia; D. F. Cooney, New York; A. G. Tompkins & Co., Boston.
- Glen Iron Works, The Allentown Rolling Mills, lessees, Allentown. First put in operation in 1870; 8 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8½ and two 15-inch); product, puddled bar, tops and bottoms, and spike rods; annual capacity, 7,500 net tons. *See Allentown Rolling Mills. See Lehigh Valley Furnaces.*
- Greenwood Rolling Mill, Charles F. Allen, Tamaqua, Schuylkill county. Built in 1865; 5 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (8½ and 16-inch). For sale.
- Keystone Iron Works Limited, Reading, Berks county. Built in 1857; one double and 5 single puddling furnaces, 2 heating furnaces, and one 18-inch train of rolls; product, boiler plate, skelp, tank, chute,



- stack, pipe, boat, and car iron, and muck bars; annual capacity, 5,000 net tons. Jacob Snell, Chairman; J. H. Craig, Secretary and Treasurer. Laurel Iron Works, operated by Coatesville Iron Works, W. J. Carmichael, Manager, Coatesville, Chester county. Built in 1825; one annealing furnace, 3 heating furnaces, and 2 trains of rolls; water and steam power; product, flue and tube iron; annual capacity, 6,000 net tons. *See Coatesville Iron Works.*
- Little Schuylkill Rolling Mill, (Milldale,) Port Clinton, Schuylkill county. Built in 1868; one single and 2 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 10, one 16, and one 18-inch); water and steam power; product, merchant bar, guide iron, tee, channel; and angle iron; annual capacity, 2,500 net tons. W. L. McDowell, Trustee.
- Longmead Iron Works, Jawood Lukens, Conshohocken, Montgomery county. Built in 1882, and put in operation in November, 1882; 5 double puddling furnaces and one train of 20-inch rolls; product, muck bar; annual capacity, 6,600 net tons.
- Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Built in 1810; 3 double puddling furnaces, 5 heating furnaces, 2 trains of rolls, and one hammer; steam and water power; product, all kinds of boiler and ship plates, flue and bridge iron, and homogeneous steel plates; also, machine-flanged boiler heads; annual capacity, 11,000 net tons. The puddle mill, operated by steam and water power, occupies the site of the first plate mill built in the United States.
- McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. First put in operation in 1857; 2 double and 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (break-down rolls, 52 in. x 25 in., and finishing rolls, 81 in. x 25 in.,) and one 3-ton hammer; product, every variety of plate iron; annual capacity, 6,000 net tons. Brand, "McIlvain." *See Bloomaries.*
- Norristown Iron Works, James Hooven & Son, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, (one 10 and two 18-inch,) and one hammer; product, skelp iron, part of which is made by the firm into butt-welded pipes, and the remainder sold; annual capacity, 5,000 net tons. James Hooven, owner. *See Schuylkill Valley Furnaces.*
- Parkesburg Iron Works, Parkesburg Iron Company, Parkesburg, Chester county. First started in April, 1873; 4 double puddling furnaces, 6 charcoal finery fires, 3 heating furnaces, one 22-inch train of rolls, and 2 hammers; product, pipe skelp iron and boiler plate; annual capacity, 4,000 net tons. Brand, "P. I. Co." Horace A. Beale, President; William H. Gibbons, Vice-President; Amos Michener, Secretary; Samuel R. Parke, Treasurer; A. J. Williams, General Manager.
- Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Company, W. E. C. Coxe, Superintendent, Reading. Built in 1868; 12 single puddling furnaces, 10 heating furnaces, and 3 trains of rolls (one 12, one 23, and one 24-inch); product, rails, splice bars,



- and muck bars; annual capacity, 50,000 net tons. Specialty, reheated iron rails. Bessemer steel rails are rolled from purchased blooms. Brand, "P. & R." See *Schuylkill Valley Furnaces*. See *Virginia Furnaces*. See *Port Carbon Iron Works*.
- Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Built in 1808; 21 double puddling and 9 heating furnaces, 2 rivet machines, and 4 trains of rolls, (one 3-high 26-inch and three 3-high 20-inch). New mill built in 1873; 3 small and 7 large and 3 double Siemens heating furnaces, 24 Siemens and 20 Wilson gas producers, using anthracite coal, and 4 trains of rolls (one 9, one 13, and two 20-inch). Product, bar iron, beams, angles, tees, other shapes, and rails; combined annual capacity, 50,000 net tons. David Reeves, President; W. H. Reeves, General Superintendent; George Gerry White, Secretary; James O. Pease, Treasurer. See *Schuylkill Valley Furnaces*.
- Pine Iron Works, Bailey & Shoemaker, Pine Iron Works P. O., Berks county. Telegraph address, Pottstown. Two mills: Pine Iron Works and Glendale Iron Works, the former built in 1845 and the latter in 1881; 4 heating furnaces and 2 trains of rolls (one 72 in. x 18 in. and one 84 in. x 24 in.); steam and water power; product, iron and steel plates of all kinds; annual capacity, 6,000 net tons. Brands, "Pine" iron and "Pine" steel, for the most severe requirements.
- Plymouth Rolling Mill Company, Conshohocken, Montgomery county. Philadelphia office, 261 South Fourth st. Built in 1881-2; 7 double puddling furnaces, 6 heating furnaces, 4 trains of rolls, and 7 nail machines; product, muck bar, plate and sheet iron, plate and sheet steel, and nails; annual capacity, 7,500 net tons of muck bars, 5,500 tons of finished iron, and 12,000 kegs of nails. Brand, "Plymouth." W. Dwight Bell, President; E. M. Valentine, Secretary; A. Schwarze, Treasurer; S. Fulton, General Manager. See *Schuylkill Valley Furnaces*.
- Port Carbon Iron Works, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Works at Port Carbon, Schuylkill county. Eight double puddling furnaces, 3 heating furnaces, 2 spike machines, and 2 trains of rolls (10 and 16-inch). Foundry and machine shop attached. See *Philadelphia and Reading Rolling Mill*. See *Schuylkill Valley Furnaces*. See *Virginia Furnaces*.
- Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls; product, plate iron (comprising boiler, tank, pipe, and flue iron) and muck bar; annual capacity, 8,000 net tons of muck bar and 8,000 tons of plate iron. Specialties, pipe and flue iron. George H. Potts, Chairman; H. C. Hitner, Secretary and Treasurer.
- Pottstown Iron Company, Pottstown, Montgomery county. Built in 1863 and extended in 1867; 29 double puddling furnaces, 7 Siemens heating furnaces, 6 forge fires, 95 nail machines, one hammer, and 7

trains of rolls (18-inch muck, 21-inch muck, 23-inch muck, 23-inch nail plate, 24-inch universal, 25-inch plate, and 31-inch plate); product, charcoal blooms, muck bar, nails, and boiler, ship, and tank plate iron; annual capacity, 35,000 net tons of muck bar, 2,500 tons of blooms, 24,000 tons of plate iron, and 425,000 kegs of nails. Steel works built in 1885-6, with two 10-gross-ton Bessemer converters and a 36-inch blooming mill; also, one open-hearth steel furnace; product used in making nail plate and other plates and merchant steels. William H. Morris, President; Andrew Wheeler, Vice-President; Joseph K. Wheeler, Secretary; William M. Gordon, Treasurer. *See Schuylkill Valley Furnaces.*

Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville. Old mill built to make rails in 1852, rebuilt and improved since, and altered to make shapes in 1877; 10 double puddling furnaces, 12 heating furnaces, one hammer, and 4 trains of rolls (one 12, two 19, and one 23-inch); product, iron and steel beams, channels, angles, tees, bars, and shafting; total annual capacity, 30,000 net tons. Brand, "Pottsville." Steel department contains two 3-ton Clapp-Griffiths converters; first blow made February 2, 1886; product, billets, blooms, and ingots for own use and for sale; annual capacity, 30,000 net tons. C. M. Atkins, President; William Atkins, Treasurer and Superintendent; C. H. Dengler, Secretary. Selling agents, J. F. Bailey, 147 South Fourth st., Philadelphia; William H. Wallace & Co., 131 Washington st., New York; A. G. Tompkins & Co., 8 Oliver st., Boston. *See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh, Reading. Bolt and nut works organized in 1865; rolling mill department in 1871; enlarged in 1872 and 1881; 3 heating furnaces and 3 trains of rolls (one 9, one 10, and one 12-inch); product, refined merchant bar, band, and bolt iron; also, bolts, nuts, washers, rivets, etc.; annual capacity, 10,000 net tons.

Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. Flue-iron mill built in 1836; 12 single puddling furnaces, 4 heating furnaces, 3 trains of rolls, 28 nail machines, and one spike machine; product, cut nails, and bar, band, hoop, and skelp iron; annual capacity, 7,000 net tons. Plate mill built in 1863; 8 double puddling furnaces, 4 heating furnaces, one hammer, and 4 trains of rolls; product, sheet, plate, and bar iron; annual capacity, 10,000 net tons. Also make all sizes of wrought-iron pipes and tubes. Edward W. Coit, President; Thomas R. Elcock, Vice-President; F. W. Ralston, Treasurer. *See Schuylkill Valley Furnaces.*

Schuylkill Haven Rolling Mill, Schuylkill Haven Iron Company, Pottsville. Mill at Schuylkill Haven, Schuylkill county. Put in operation October 1, 1873; 2 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one railroad spike, bolt, and rivet machine; product, merchant bar iron, small T rails for mining purposes, railroad spikes, bolts, and rivets; specialty, refined merchant bar iron; annual capa-

- city, 6,000 net tons. Also, chain works with 24 hearths, testing machine, etc. L. W. Weissinger, President; C. F. Rahn, Treasurer.
- Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county. Built in 1858; 15 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, and one hammer; product, sheet and plate iron; annual capacity, 15,000 net tons. Proprietors, Alan Wood, Jr., Howard Wood, and Charles Lukens. *See Rolling Mills in Delaware.*
- Seyfert Rolling Mills, Samuel R. Seyfert, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Built in 1880-1, and started in March, 1881; 5 double puddling furnaces, 3 heating furnaces, one 4-ton hammer, and 2 trains of rolls (22 and 25-inch); product, boiler plate, boiler-tube skelp, pipe skelp, and puddled bars; annual capacity, 5,000 net tons of plate iron and 5,000 net tons of puddled bars.
- Standard Iron Company Limited, Norristown, Montgomery county. Built in 1857; 11 double puddling furnaces and 2 trains of 18-inch puddle rolls; product, puddled bars; annual capacity, 14,000 net tons. Walter H. Cooke, Chairman; John Slingluff, Secretary and Treasurer.
- Standard Steel Casting Company, Thurlow, Delaware county. Built in 1883-4, and first put in operation in March, 1884; one 10-ton Siemens-Martin open-hearth steel furnace; annual capacity, 9,000 net tons; one 18-pot steel-melting furnace; annual capacity, 500 net tons; product, open-hearth and crucible steel castings. Robert Wetherill, President; J. Newlin Trainer, Vice-President; John B. Booth, Secretary; Richard Wetherill, Treasurer; Frederick Baldt, Superintendent.
- Stony Creek Rolling Mill, Norristown, Montgomery county. Built in 1849, and rebuilt in 1879; 5 double puddling and 2 heating furnaces, and 3 trains of rolls; product, plate iron and puddled bars. For sale by James S. Swartz, 234 South Fourth st., Philadelphia.
- Thorndale Iron Works, Thorndale Iron Works Company, William L. Bailey, Treasurer and Manager, Thorndale P. O., Chester county. Telegraph address, Downingtown. Built in 1847; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (plate train 73 inches long); product, boiler and tank iron and ship plates; annual capacity, 4,000 net tons of plates and 5,000 net tons of puddled bars. Brand, "Thorndale." Charles L. Bailey, President, Harrisburg; Abraham S. Patterson, Vice-President, Philadelphia. Selling agents, Morris, Wheeler & Co. and Esherick & Co., Philadelphia; W. H. Wallace & Co., New York; G. G. Wilder, Jr., Boston.
- Valley Iron Works, C. E. Pennock & Co., Coatesville, Chester county. Built in 1837; 5 double puddling and 4 heating furnaces, one 4-ton hammer, and 4 trains of rolls (one 18, one 24, and two 30-inch); product, plate iron; annual capacity, 7,000 net tons.
- Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 49. Of these 3 make Bessemer steel, 2 make Clapp-Griffiths steel, 3 make open-hearth steel, one makes cru-

cible steel, 2 make special steel castings, and one open-hearth steel plant is standing partly completed.

## CENTRAL PENNSYLVANIA.

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

Anchor Brand Axle Works, Sheldon & Co., Wilkesbarre, Luzerne county. Works removed from Auburn, New York, in 1886, in process of erection. Product will be bar iron, all to be used in the manufacture of axles.

Bellefonte Iron and Nail Company Limited, Bellefonte, Centre county. Built in 1881-2; put in operation March 1, 1882; 11 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, (one 9 and one 15-inch bar train and one 16-inch nail-plate train,) and 53 nail machines; product, steel spikes and nails; annual capacity, 125,000 kegs of cut nails. Brand, "Bellefonte." James A. Beaver, Chairman; William V. Emery, Secretary and Treasurer; Samuel Achenbach, General Superintendent.

Bellefonte Iron Works, Valentine Ore Land Association, Bellefonte, Centre county. Built in 1798; one heating furnace and one train of rolls; steam and water power; product, covers for boiler-plate piles, billets for wire rods, scythe and shovel bars, etc.; annual capacity, 3,600 net tons. C. A. Mayer, President; B. K. Jamison, Treasurer; Charles A. Harte, Secretary, Philadelphia. *See Charcoal Furnaces. See Bloomeries.*

Berwick Rolling Mill, The Jackson and Woodin Manufacturing Company, Berwick, Columbia county. Built in 1872; 11 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (9 and 16-inch); product, merchant bar iron and forgings; annual capacity, 10,000 net tons. Brand, "Berwick." Also manufacture cars and car-wheels and cast-iron gas and water pipe. C. R. Woodin, President; Garrick Maltery, Vice-President; C. H. Zehnder, Secretary; H. F. Glenn, Treasurer.

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

- Chesapeake Nail Works, Charles L. Bailey & Co., Harrisburg, Dauphin county. Built in 1867; 18 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (20-inch puddle and 16-inch plate,) and 103 nail machines; product, iron and steel nails; annual capacity, 250,000 kegs. Brand, "Chesapeake."
- Chickies Rolling Mill, Becker & Reinhold, Chickies, Lancaster county. Built in 1865; 4 double puddling furnaces and 2 trains of rolls (9 and 16-inch); product, muck bar; annual capacity, 4,000 net tons.
- Columbia Iron Company, Columbia, Lancaster county. First put in operation July 13, 1886; 3 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (9 and 16-inch); product, bar, skelp, and horse-shoe iron; annual capacity, 5,000 net tons. Andrew J. Kauffman, President; J. W. Yocum, Secretary; George Crane, Treasurer; C. S. Kauffman, General Manager.
- Columbia Rolling Mill Company, Columbia, Lancaster county. Built in 1854; 16 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, skelp and tube iron a specialty; annual capacity, 15,000 net tons. Originally built to roll rails. John Q. Denney, President and General Manager; John J. Cochran, Secretary; J. W. Steacy, Treasurer. *See Lower Susquehanna Furnaces.*
- Crescent Nail Works, Standard Nail and Iron Company, Williamsport, Lycoming county. Works at Standard, a few miles distant. Built in 1842; burned February 17, 1886, and rebuilt the same year; 4 single puddling furnaces, one heating furnace, 2 trains of rolls, and 18 nail machines; product, nails and bar iron; annual capacity of nails, 25,000 kegs. Brand, "Standard." J. Corcoran, Treasurer; G. L. Bostley, Superintendent of mill.
- Danville Nail Works, Danville Nail and Manufacturing Company, Danville, Montour county. Built in 1883, and first nails made August 31, 1883; 3 double puddling furnaces, two 30-ton heating furnaces, 2 trains of rolls, (18-inch puddle and 18-inch plate,) and 80 nail machines; product, iron and steel nails; annual capacity, 225,000 kegs. D. M. Boyd, President; William C. Frick, Secretary and Manager; R. M. Grove, Treasurer.
- Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; 16 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (8, 16, 18, and 20-inch,) and 64 nail machines; product, bar iron and iron and steel nails; annual capacity, 5,000 net tons of bar iron and 135,000 kegs of nails. John Wister, President and Treasurer; William E. S. Baker, Secretary and Assistant Treasurer. *See Upper Susquehanna Furnaces.*
- Eagle Iron Works, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1825; one single puddling furnace, one heating furnace, and two 15-inch trains of rolls; water-power; product, wire billets, boiler-plate pile covers, and assorted bar iron from  $\frac{1}{2}$ -inch round and square to 4-inch tire; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

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

Green Ridge Iron Works, A. L. Spencer, Scranton, Lackawanna county. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; one heating furnace and 2 trains of rolls (10 and 12-inch); product, bar, angle, and channel iron, car axles, 25-lb. mine rails, strap rails, toe-calk steel, and bar steel; annual capacity, 1,200 net tons of bar and shaped iron, and 4,000 tons of mine and strap rails. W. B. Borst, Superintendent; D. B. Atherton, Secretary and sales agent.

Harrisburg Nail Works, McCormick estate, Harrisburg. Works at Fairview, Cumberland county, on the Northern Central Railway. Built in 1810; 9 double puddling furnaces, 3 heating furnaces, two 19-inch trains of rolls, and 80 nail machines; steam and water power; product, iron and steel nails and muck bar; annual capacity, 10,000 net tons (200,000 kegs) of nails and 2,000 tons of muck bar. Brand, "Harrisburg." Henry McCormick, Treasurer.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Built in 1860; one double and 6 single puddling furnaces, 3 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 18-inch,) and 24 nail machines; product, merchant bar, angle, skelp, and hoop iron, and cut nails and spikes; annual capacity, 60,000 kegs of cut nails and 3,000 net tons of other products. Brand, "Juniata." J. D. Hemphill, President; J. W. Bracken, Treasurer and General Manager; Thomas F. Johnston, Secretary.

Howard Iron Works, Bernard Lauth, Howard, Centre county. Built in 1840; 6 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 12-inch, one 16-inch, and one rod mill); water-power; product, carriage bolts. *See Charcoal Furnaces. See Bloomaries.*

Johnson (Reuben) & Co., Northumberland, Northumberland county. Built in 1883, and first put in operation in January, 1884; 10 double puddling furnaces, 2 heating furnaces, two 20-inch trains of rolls, and 100 nail machines; product, iron and steel nails; annual capacity, 200,000 kegs. Brand, "Milton Nail Works."

Juniata Rolling Mill, McLanahan, Smith & Co. Limited, Hollidaysburg. Built in 1866; 16 single puddling and 3 heating furnaces, 2 trains of rolls, 30 nail machines, and one hammer; product, bar and pipe iron and cut nails and spikes; annual capacity, 9,000 net tons.

Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Commenced in 1840; 42 single puddling furnaces, 33 heating furnaces, and 10 trains of rolls, (one 12, two 18, two 20, three 23½, one 31, and one 36-inch,) and 2 hammers; product, light and heavy railroad rails, merchant bars, and car axles; annual capacity, 185,000 net tons of steel and iron rails and 15,000 tons of iron and steel merchant bars and car axles. Bessemer steel works added in 1875; two 5-gross-ton converters, 4 cupolas, and 3 spiegel



cupolas; annual capacity, 168,000 net tons of ingots; first blow made October 23, 1875; first steel rail rolled December 29, 1875. Brand, "Lackawanna." E. F. Hatfield, President, 52 Wall st., New York; H. V. Vultee, Secretary, New York; Edward C. Lynde, Assistant Secretary, Scranton, Pa.; Theodore Sturges, Treasurer, New York; Charles F. Mattes, General Manager, Scranton, Pa.; Theodore G. Wolf, Superintendent of steel rolling mill; Charles F. Manness, Superintendent of steel converting works. *See Upper Susquehanna Furnaces.*

Lebanon Iron Company, Lebanon. Built in 1882-3; 6 double puddling furnaces and two 20-inch trains of rolls; product, muck bar; annual capacity, 10,000 net tons. Robert H. Coleman, President; A. Hess, Secretary and Treasurer; Thomas Evans, Superintendent.

Lebanon Rolling Mills, Samuel E. Light, Lebanon. Built in 1867; 4 double puddling furnaces, 5 heating furnaces, 5 forge fires, 4 trains of rolls, and 2 hammers; product, plates up to 65 inches wide, and sheet iron; annual capacity, 6,500 net tons. *See Bloomaries.*

Lewisburg Nail Works, Lewisburg, Union county. First put in operation November 10, 1884; 3 double puddling furnaces, one heating furnace, one 18-inch train of rolls, and 35 nail machines; product, iron nails; annual capacity, 50,000 kegs. T. H. Croft, President and Manager; Jonathan Wolfe, Treasurer; E. M. Purdy, Secretary; L. B. Wolfe, selling agent.

Lickdale Iron Company, Lebanon. Works at Lickdale. Building one 3-gross-ton Clapp-Griffiths steel converter; to be completed in September, 1886; product, ingots for various purposes; annual capacity, 22,000 net tons. Buildings and machinery adapted to second converter. John H. Lick, President; James Meily, Superintendent; C. Penrose Sherk, Managing Director. *See Bloomaries.*

Lochiel Iron and Steel Works, Harrisburg. Original works built in 1865 to roll rails; 10 double and 2 single puddling furnaces, 12 heating furnaces, and 3 trains of rolls (9, 16, and 19-inch); product, skelp iron; annual capacity, 10,000 net tons. Edward Sayre Gearhart, President; Charles H. Reynolds, Secretary; Charles W. Eckman, Treasurer; A. Creveling, Manager.

Logan Iron and Steel Works, Logan Iron and Steel Company, Lewistown, Mifflin county. Office, 218 South Fourth st., Philadelphia. Started in 1869; one single and 9 double puddling furnaces, 5 heating furnaces, 3 hammers, and 5 trains of rolls (one 8, one 12, one 16, and two 18-inch); steam and water power; product, charcoal and refined bar iron, bent truck sides, coupling links, and pins. H. T. Townsend, President; S. H. Pitcher, Secretary; R. F. Kennedy, Treasurer; R. H. Lee, Superintendent. *See Charcoal Furnaces. See Coke Furnaces.*

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



- tons; rod mill, 1,500 net tons. *See Charcoal Furnaces. See Bloomaries.*
- Milton Manufacturing Company, Milton, Northumberland county. Building a rolling mill with 2 heating furnaces and 2 trains of rolls, to make light iron and steel. S. J. Shimer, President; W. N. Taylor, Secretary and Treasurer; John N. Lauth, Manager.
- Milton Nail Works, C. A. Godcharles & Co., Milton, Northumberland county. Built in 1875; 4 single and 9 double puddling furnaces, 2 heating furnaces, one 20-inch train of rolls, and 100 nail machines; product, iron and steel nails; annual capacity, 200,000 kegs. Selling agents, R. Johnson & Co., Northumberland.
- Milton Rolling Mill and Steam Forge, Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 6 single and 3 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8 and two 15-inch); product, round, square, and flat bar iron; annual capacity, 4,000 net tons. Forge contains 3 heating furnaces, 2 hammers, and other machinery for the production of car axles and iron and steel forgings. Brand, "Milton." W. A. Schreyer, President; Fred. M. Kelly, Secretary; John M. Young, Treasurer; John Jenkins, Superintendent. *See Williamsport Iron and Nail Works.*
- Montour Iron and Steel Works, Montour Iron and Steel Company, Danville. Built in 1845; 6 double and 27 single puddling furnaces, 19 heating furnaces, 5 trains of rolls, (one 12, one 16, and three 20-inch,) and one 5-ton hammer; product, iron rails, bar iron, spikes, and splice bars; annual capacity, 50,000 net tons. W. E. C. Coxe, President, Reading; T. F. McGinnes, General Superintendent, Danville; C. M. Bayard, Secretary and Treasurer, 216 South Third st., Philadelphia. *See Upper Susquehanna Furnaces.*
- North Branch Steel Company, Danville, Montour county. Philadelphia office, 330 Walnut st. Works formerly known as the Co-operative Iron and Steel Works; established in 1871, and operated for years as a rail mill; changed to a steel works in 1882-3; first steel made February 15, 1883; one 15-gross-ton Siemens open-hearth steel furnace, 6 heating furnaces, one 5,500-pound hammer, and 3 trains of rolls (19-inch "combination," 28 x 84-inch plate, and 22 x 48-inch sheet); product, steel boiler, ship, and tank plates, shovel plates, sheets, rails, shapes, slabs, and machinery and agricultural steel; annual capacity, 14,000 net tons. F. P. Howe, President and Manager, Danville; H. D. Wheldon, Vice-President, and Walter S. Massey, Secretary and Treasurer, 330 Walnut st., Philadelphia.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 8 single puddling furnaces, one 30-gross-ton regenerative gas heating furnace, one 16-inch train of muck and plate rolls, and 53 nail machines, having Coyne's patent automatic nail assorters and Morrison's spike rejecter attached; product, iron and steel nails, axe bar, nail plate, muck and scrap bars; annual capacity, 5,400 net tons of muck bar, 9,500 tons of nail plate, and 150,000 kegs of nails. Also have a foundry and machine shop.

Paxton Rolling Mills, McCormick estate, Harrisburg. Built in 1869; 7 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, and one 3-ton hammer; product, boiler plate, tank, and skelp iron; annual capacity, 10,000 net tons. Brand, "Paxton." A 3-ton Clapp-Griffiths steel converter added in 1886; made an experimental blow April 27, 1886. John Q. Denney, Superintendent. *See Lower Susquehanna Furnaces.*

Penn Iron Works, Penn Iron Company Limited, Lancaster, Lancaster county. First put in operation in April, 1873; 2 single and 5 double puddling furnaces, 5 heating furnaces, 4 trains of rolls, (one 8-inch guide, one 9-inch guide, one 16-inch bar, and one 18-inch puddle,) and 2 hammers; product, merchant bar iron, hammered and rolled axles, car forgings, bridge work, fish joints, bolts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 15,000 net tons. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Secretary and Treasurer; W. B. Middleton, Superintendent.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; burned and rebuilt in 1886; one heating furnace and one 10-inch train of rolls; product, bar iron, bolts, nuts, washers, etc.; annual capacity, 6,500 net tons. Henry S. Eckert, President; James Lord, Secretary and Treasurer; H. V. L. Meigs, Superintendent.

Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel works built in 1865-7; two 7-gross-ton and three 8-ton converters; made their first blow in June, 1867; annual capacity, 350,000 net tons ingots, worked into blooms and slabs for structural purposes and plates, nail slabs, rails of all sections, street rails, railroad axles, crossings, frogs, switches, and merchant steels generally. Rolling mill built in 1867-8; blooming mill added to the rolling mill in 1875-6, and put in operation in December, 1876; annual capacity, 200,000 net tons rails. Hammer mill contains 4, 6, and 12-ton hammers. Open-hearth steel plant, containing two 15-gross-ton furnaces, was erected in 1875; furnaces removed in 1883, and two 30-ton furnaces erected; annual capacity, 24,000 net tons ingots, worked into boiler and structural steel and special steels. Merchant mill, erected in 1883, contains one 13 and one 20-inch train. There are also machine shops and the necessary repair shops connected with the works. S. M. Felton, President; E. F. Barker, Secretary and Treasurer; Luther S. Bent, Vice-President and General Manager; F. W. Wood, Superintendent; E. C. Felton, Assistant Superintendent. S. W. Baldwin, sales agent, New York. *See Lower Susquehanna Furnaces. See Maryland Furnaces.*

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

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

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

Schull Iron Works, William Schull & Sons, Danville, Montour county. Built in 1847 to make iron rails, and recently known as the Glendower Iron Works; refitted by present owners; 3 double and 11 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls (10, 13½, and 16½-inch); product, skelp iron and merchant bar; annual capacity, 20,000 net tons. Selling agents, Henry Levis & Co., Philadelphia.

Scranton (The) Steel Company, Scranton, Lackawanna county. Built in 1881-3; two 6-gross-ton Bessemer steel converters, 5 pig-melting cupolas, and 3 spiegel cupolas; first blow made March 29, 1883, and first steel rail rolled May 4, 1883; 6 heating furnaces and 3 trains of 32-inch rolls; product, steel rails and billets; annual capacity, 200,000 net tons of ingots, and 175,000 net tons of rails. Brand, "Scranton Steel Co." W. W. Scranton, President and Manager, and E. P. Kingsbury, Secretary and Treasurer, both at Scranton; Walter Scranton, Vice-President, 47 Broadway, New York.

Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 11 heating furnaces, 4 hammers, (one 10-ton Tannet & Walker, one 7-ton Sellers, one 30-cwt. Morris, and one 4,000-lb. helve,) and 2 tire mills; product, steel locomotive and car tires, and forgings. Specialty, locomotive and car-wheel tires. Ingots are obtained from the Otis Iron and Steel Company, and are worked here. Brand, the word "Standard" between two anchors. Charles T. Parry, President; William Burnham, Secretary and Treasurer; William G. Neilson, Manager; J. P. Stevenson, Superintendent.

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

Susquehanna Iron Works, Susquehanna Iron Company, Columbia, Lancaster county. Built in 1860; 12 single puddling furnaces, 3 heating

furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 8,000 net tons. M. Schall, President; Vernon Ellis, Secretary and Treasurer; John Paine, Superintendent.

Towanda Nail Works, R. A. Bostley & Co., Towanda, Bradford county.

First started in November, 1872; 2 double puddling furnaces, 4 heating furnaces, 31 nail machines, and two 19-inch trains of rolls; product, iron and steel nails; annual capacity, 70,000 kegs. Brand, "Milton Nail Works, Towanda, Pa."

Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Forges

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

West Lebanon Rolling Mill Company Limited, Lebanon, Lebanon county.

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

Williamsport Iron and Nail Works, Milton Iron Company, Williamsport,

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

York Rolling Mill, Schall, Steacy & Denney, York, York county. Built

in 1869; 7 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (one 18 and two 22-inch,) and one hammer; product, plate and skelp iron; annual capacity, 9,000 net tons.

Number of rolling mills and steel works in Central Pennsylvania: 48

completed, and 3 building. Of these 3 are Bessemer steel works, 2 are open-hearth steel works, one is a Clapp-Griffiths steel works, and one Clapp-Griffiths steel works is building.

#### PITTSBURGH AND ALLEGHENY COUNTY.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers

& Phillips, Pittsburgh, Allegheny county. Lower mills situated at Wood's Run Station, Allegheny City; upper mills situated on Tenth and Fifteenth sts., South Side, Pittsburgh. Operations first begun in 1863; 102 single puddling furnaces, 30 heating furnaces, 14 hammers, and 17 trains of rolls (five 8, three 10, four 16, three 20, one 25, and one 32-inch); product, plate and angle iron, skelp iron, light T rails, bar iron, etc., part of which is used in the production of wrought-iron hardware, consisting of bolts, nuts, washers, hinges, etc.; annual capacity, 120,000 net tons. Steel works containing two 2-ton Clapp-Grif-

fifth stationary converters, for the production of Bessemer steel for miscellaneous uses, built in 1884; first blow made March 25, 1884; annual capacity in ingots, 48,000 net tons. Lower mills use natural gas in part for fuel; upper mills use it exclusively.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Built in 1852; 72 single puddling furnaces, 22 heating furnaces, 13 trains of rolls, 2 hammers, and 63 nail machines; product, bars, nails, plates, sheets, cold-rolled shafting, structural iron, etc.; annual capacity, 175,000 kegs of cut nails and 80,000 net tons of other products. Brand, "American." Building Bessemer steel works to contain two 7-gross-ton converters; product will be worked into various forms for the market. Natural gas exclusively used for fuel. B. F. Jones, Chairman; G. M. Laughlin, Secretary and Treasurer; T. M. Jones, General Manager.

Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. Built in 1842; 24 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (one 12, one 16, and two 18-inch,) 96 nail machines, 65 tack machines, and 2 hammers; product, spikes, nails, tacks, and American and Swedish plates from 4 to 12 inches wide; annual capacity, 200,000 kegs of nails and 5,000 net tons of plates. New steel plate mill completed at Rankin Station in 1886; gas heating furnaces and 3-high 24-inch plate train. Fuel used, natural gas exclusively.

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

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

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

Carnegie, Phipps & Co. Limited, successors to the Pittsburgh Bessemer Steel Company Limited, proprietors of the Homestead Steel Works, 48 Fifth Avenue, Pittsburgh. Works at Munhall Station. Built in 1880-1; two 4-gross-ton converters; made their first blow March 19, 1881; first steel rail rolled August 9, 1881; one 30-inch blooming mill, one 23-inch rail and billet train, one 32-inch train for structural shapes, and one 33-inch plate train, 120 inches long; 4 Hainsworth soaking pits; product, blooms, billets, steel beams, and structural steel; annual capacity in ingots, 150,000 net tons, rails 125,000 tons,

and other steel products 50,000 tons. Open-hearth steel plant now building at Munhall Station; four 35-gross-ton Siemens-Martin furnaces; product, bridge steel, best boiler plates, and ship and tank plate; estimated annual capacity, 50,000 net tons. Also proprietors of Twenty-ninth Street Iron Works, formerly Wilson, Walker & Co.; first put in operation in 1862; 31 single puddling furnaces, 18 heating furnaces, 5 trains of rolls, (2 universal, and one 10, one 15, and one 18-inch,) 25 forge fires, and 16 hammers, (7,000 pounds to 700 pounds); product, universal mill plates, railway forgings, bridge work, angles, special shapes, axles, and bar iron; annual capacity of rolled iron, 22,000 net tons. Fuel used, natural gas exclusively. John Walker, Chairman; H. P. Smith, Secretary; W. H. Singer, Treasurer; Julian Kennedy, General Superintendent. *See Lucy Furnaces.* Chartiers Iron and Steel Company Limited, Iron Exchange, Wood and Water sts., Pittsburgh. Works at Putnam P. O., (Mansfield Valley telegraph office,) Allegheny county. Built in 1883-4, and put in operation August 13, 1884; 4 single puddling furnaces, 11 heating furnaces, 3 trains of rolls, and one 4-ton hammer; product, sheet iron and sheet steel; annual capacity, 5,000 net tons. Brand, "Chartiers." Natural gas exclusively used for fuel. John C. Kirkpatrick, Chairman; D. A. Carter, Secretary; B. C. Willson, Treasurer; John Henry, Superintendent.

Clinton and Millvale Rolling Mills, Graff, Bennett & Co., Pittsburgh. Two mills: Clinton on the South Side and Millvale at Bennett Station, on W. P. R. R. Clinton was built in 1846; 7 double and 12 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 41 nail machines. Millvale was built in 1850, burned December 11, 1881, and rebuilt in 1882; 10 Danks rotary puddling furnaces, one double, one double-double, and 21 single puddling furnaces, 18 heating furnaces, 8 trains of rolls, and one hammer; building an open-hearth steel plant, to contain two 15-gross-ton Siemens-Martin furnaces. Product, bars, sheets, plates, and nails; total annual capacity, 35,000 net tons. Natural gas exclusively used for fuel. *See Fort Pitt Iron and Steel Works. See Furnaces.*

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

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



Eagle Rolling Mill and Tube Works, J. W. Friend & Co., Carson st., Thirty-fourth ward, South Side, Pittsburgh. Branch office, 208 Wood st., Pittsburgh. Built in 1848; 17 single puddling furnaces, 4 heating furnaces, 3 steel-heating furnaces, and 4 trains of rolls (one 16 and three 20-inch); during July, 1884, a plant for the production of tubes was built; product, muck bar, bar iron, skelp iron, plow steel, and wrought-iron pipe; daily capacity, double turn, 35 net tons. Brand, "Eagle." Fuel used, natural gas exclusively.

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

Elba Iron and Bolt Company Limited, Elba Station, Baltimore and Ohio Railroad, Pittsburgh. Built in 1862; 29 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls (one 8, one 10, one 18 inch, and one muck train); product, bolts, nuts, washers, merchant bar, railroad supplies, skelp iron, small forgings, etc.; annual capacity, 25,000 net tons. Formerly called Pittsburgh Bolt Works. Fuel used, natural gas exclusively. Charles Donnelly, Chairman; T. B. Everson, General Manager.

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

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Open-hearth steel works built in 1882, and started in August, 1882; two 12-gross-ton Siemens open-hearth furnaces; one 12-pot crucible furnace, started in May, 1885; product, steel castings; annual capacity, 18,000 net tons. Use natural gas for fuel in all departments



except air furnace and cupolas. James Hemphill, Chairman; W. Wade, Secretary; Pennock Hart, Treasurer; N. A. Hemphill, Superintendent.

Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. Built in 1862; 22 single puddling furnaces, 18 heating furnaces, 7 hammers, two 30-pot Siemens steel-melting furnaces, and 8 trains of rolls (two 8, one 9, one 12, two 16, and two 22-inch); product, plates, sheets, guide iron, bar iron, light T rails, and German and cast steel; annual capacity, 12,000 net tons merchant iron, 4,000 tons tool steel, and 6,000 tons special steel. Natural gas exclusively used for fuel. *See Clinton and Millvale Rolling Mills. See Furnaces.*

Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Built in 1857; 23 heating furnaces, 18 railroad spike machines, and 5 trains of rolls, (two 8, one 10, and two 16-inch,) two trains being continuous trains for spike iron; product, railroad and marine spikes; annual capacity, 30,000 net tons. Brand, "Dilworth, Porter & Co." Natural gas exclusively used for fuel. Charles R. Dilworth, Chairman; Samuel T. Owens, Vice-Chairman; Joseph R. Dilworth, Secretary and Treasurer.

Hussey, Binns & Co. Limited, Pittsburgh. Steel plant built in 1875; one 24-pot Siemens steel-melting furnace, 3 sets of rolls, 16 heating furnaces, one steam hammer, 3 helve hammers, and numerous machines used in shovel-making; product, crucible cast steel, used by the firm in making shovels, spades, and scoops; annual capacity, 1,500 net tons ingots. Fuel used, natural gas exclusively. Edward B. Alsop, Chairman; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent.

Hussey, Howe & Co. Limited, Penn avenue and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 35 heating furnaces, 13 hammers with 20 furnaces, 6 smith-shop fires and one smith-shop steam hammer, one double and 4 single annealing furnaces, six 24-pot and two 30-pot Siemens steel-melting furnaces, 11 trains of rolls, (one 9, one 10, one 12, three 16, three 18, one 22, and one 28-inch,) one rake-tooth factory with 12 bending machines and 12 heating furnaces, one machine shop with 8 lathes, planers, etc.; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 12,000 net tons of ingots. The open-hearth steel department has one 35-gross-ton Siemens furnace, built in 1886; product, spring, plow, and machinery steel, and plates for boilers, hulls of vessels, etc.; annual capacity, 8,000 net tons of plates, 2,000 net tons of machinery steel, 2,000 net tons of plow steel, and 500 net tons of spring steel. Fuel used, natural gas exclusively. C. G. Hussey, Chairman; James W. Brown, Treasurer; J. J. Young, Manager. Branch offices, 3 Cliff st., New York; 127 Oliver st., Boston; 210 Lake st., Chicago.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Established in 1824; two 12-gross-ton Siemens-Martin open-hearth steel

furnaces, annual capacity, 12,000 net tons, one built in 1879, and one built in 1881; one 7-gross-ton Bessemer converter, with all modern appliances, made its first blow March 15, 1886; 29 single puddling furnaces, 17 heating furnaces, 4 annealing furnaces, 4 furnaces for heating nail plates, one furnace for annealing nails, 9 hammers, 9 trains of rolls, (2 muck trains, one 16 and one 8-inch bar, 2 sheet trains, 31 by 112-inch plate train, nail-plate train, and blooming-mill train,) 92 nail machines, and 4 horse-shoe machines; product, steel boiler plate, sheet steel, plate steel, fire-box steel, horse-shoe bar, horse and mule shoes, steel blooms, nails, and sheet and plate iron; annual capacity, 60,000 net tons. Brand of nails and horse and mule shoes, "Juniata;" horse-shoe bar, "Shoenberger;" sheet and plate iron, 3 grades, "Penn," "Charcoal," and "Juniata." Fuel used, natural gas exclusively.

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

Keystone Rolling Mill, Keystone Rolling Mill Company Limited, Pittsburgh. Built in 1865; 29 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, skelp iron; annual capacity, 10,000 net tons. Brand, "Keystone." Fuel used, natural gas exclusively. James McCutcheon, Chairman; N. M. McDowell, Secretary; James H. McCutcheon, Treasurer; Thomas Venners, Superintendent.

La Belle Steel Works, Smith Bros. & Co., Pittsburgh. Built in 1863; two 25 and two 30-ton converting furnaces, one single and 2 double puddling furnaces, 22 forge fires, 21 heating furnaces, one 36-pot and two 42-pot Siemens gas steel-melting furnaces, 11 hammers, and 4 trains of rolls (one 9, one 10, one 16, and one 20-inch); product, merchant steels of every description; also, rake teeth for sulky rakes, springs, and iron and steel axles; annual capacity, 10,000 net tons. One 15-gross-ton Siemens open-hearth steel furnace and one 8-ton Morgan hammer added in 1886. Fuel used, natural gas exclusively. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and 115 Liberty st., New York; C. E. James & Co., Chattanooga, Tennessee.

Liggett Spring and Axle Company Limited, Pittsburgh. Works at Spruce and Market sts., Allegheny City. Built in 1865 and 1882; one 30-ton cementing furnace, 5 double and 3 single heating furnaces, one 16-inch train of rolls, and 11 hammers; make German steel, which is used in spring works; product, buggy and wagon springs and axles; annual capacity of finished goods, 2,500 net tons. Fuel used, natural gas exclusively. N. P. H. Hugus, Chairman.

Linden Steel Company Limited, Lewis Building, (branch office,) Pittsburgh. Works and general office at Linden Station, B. & O. R. R. Open-hearth steel works built in 1879, containing one 15-gross-ton and one 10-gross-ton Siemens open-hearth steel furnace, 15 heating

furnaces, blooming mill, one large plate mill, one 18-inch bar mill, one 20-inch sheet train, two 10-inch trains, 5 hammers, and cold-condensing shafting machinery; product, open-hearth steel ingots, blooms, billets, and slabs; also, bands, squares, flats, boiler, tank, and ship plates, sheets, tool, spring, tire, and agricultural steel, and cold-condensed shafting; unusual shapes a specialty; daily capacity, double turn, 75 net tons. Brand, "Linden." Fuel used, natural gas exclusively. W. J. Lewis, President; Henry Lloyd, Vice-President; Cephas Taylor, Secretary; M. D. W. Loomis, Treasurer; Richard Hurrell, Manager.

McKeesport Iron Works, W. D. Wood & Co. Limited, 111 Water st., Pittsburgh. Works at McKeesport, Allegheny county. Built in 1851; 17 forge fires, 12 single puddling furnaces, 22 heating furnaces, 8 trains of rolls, and 10 hammers; product, sheet iron, both common and planished; specialty, Patent Planished sheet iron; annual capacity, 9,000 net tons. Trade-mark, a Russian bear in the talons of an American eagle. Fuel used, natural gas exclusively. W. Dewees Wood, Chairman; Alan W. Wood, Secretary and Treasurer; Richard G. Wood, General Manager; Thomas D. Wood, Assistant Manager.

National Tube Works Company, McKeesport, Allegheny county. Four mills: National Rolling Mill No. 1 was built in 1879; 15 Siemens double puddling furnaces, 8 heating furnaces, 2 sets of 3-high muck rolls, one plate mill, and one continuous mill; one 10-gross-ton Siemens open-hearth steel furnace added in 1886. National Rolling Mill No. 2 was built in 1882; 18 single puddling furnaces, one heating furnace, one set of slab rolls, and two 8-ton steam hammers. National Rolling Mill No. 3 building in 1886; 30 single puddling furnaces and 2 sets of 3-high muck rolls. Finished product of the foregoing mills, boiler tube and pipe iron, boiler plate, and all kinds of wrought-iron pipe; annual capacity, 75,000 net tons. Brand, "National." National Forge and Iron Works were built in 1881; 12 forge fires, one run-out fire, one hammer, one heating furnace, and one set of slab rolls; product, blooms and billets for boiler tubes and boiler plate; annual capacity, 8,000 net tons. Fuel used, natural gas exclusively, from the company's own line. James C. Converse, President; P. W. French, Secretary; William S. Eaton, Treasurer; J. H. Flagler, General Manager; E. C. Converse, Assistant General Manager.

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

Oliver and Roberts Wire Company Limited, Pittsburgh. Built in 1884 and first put in operation June 12, 1884; 2 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); product, wire rods, drawn into wire by the same company; annual capacity, 25,000 net

tons. Natural gas exclusively used for fuel. Henry W. Oliver, Jr., Chairman; George T. Oliver, Vice-Chairman; William H. Cassidy, Secretary and Treasurer; Henry Roberts, General Superintendent.

Pennsylvania Iron Works, Everson, Hammond & Co. Limited, Pittsburgh. Built in 1843; 14 single puddling furnaces, 11 heating furnaces, 7 trains of rolls, and one 10-gross-ton open-hearth steel furnace; first steel made in January, 1886; product, sheet iron and steel, bars, and universal plates; annual capacity, 4,000 net tons of steel ingots and 10,000 tons of finished products. Brand, "Everson." Fuel used, natural gas exclusively. W. J. Hammond, President; John Q. Everson, Manager.

Pittsburgh Forge and Iron Company, Tenth st. near Penn avenue, Pittsburgh. Built in 1864; 33 single puddling furnaces, 13 heating furnaces, 4 trains of rolls, (one 9, one 16, and two 20-inch,) and 5 hammers (one 4-ton and 4 one-ton); product, bolts, nuts, bar iron, splice bars, shaped iron, and hammered car and locomotive axles; total annual capacity, 29,000 net tons. Brands, "P. F. & I." and "Special." Fuel used, natural gas exclusively. Calvin Wells, President and Treasurer; James K. Verner, Secretary and selling agent; Joseph Kaylor, Manager.

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

Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. Built in 1871; two 24-pot Siemens steel-melting furnaces, one 24-pot coke steel-melting furnace, and 7 annealing furnaces; product, crucible steel castings; annual capacity, 4,000 net tons. One 5-ton Bessemer steel converter, built in 1881; first blow made August 26, 1881; one equalizing pit, one heating furnace, billet mill, slab mill, 200-ton Hainsworth hydraulic forging press, and one 5-ton hammer; product, steel castings and billets; annual capacity, 67,000 net tons. A 7,500-ton hydraulic forging press to be added. Natural gas used throughout, except in cupolas. W. G. Johnston, President; Thomas C. Lazear, Vice-President; William Lyon, Secretary; John Irwin, Jr., Treasurer; William Hainsworth, Superintendent.

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

- agricultural, and all other grades of crucible and open-hearth steel, and forgings and springs of all shapes and qualities; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively. David Shaw, Superintendent. Selling agents, M. T. Miles & Son, Chicago; D. H. Kent & Co. Limited, Philadelphia; H. J. Hopper, New York; Joseph M. Rogan, general sales agent spring department, Chicago.
- Republic Iron Works Limited, First avenue and Smithfield st., Pittsburgh. Built in 1863; 26 single puddling furnaces, 12 heating furnaces, 4 sheet furnaces, 10 forge fires, and 8 trains of rolls (one 10, one 16, two 20, three 22, and one 24-inch); product, boiler tube and pipe iron, and sheet and plate iron; annual capacity, 20,000 net tons of boiler tube and pipe iron and 6,000 net tons of sheet and plate iron. Brand, "Republic." An extensive galvanizing department is connected with the works. Fuel used, natural gas exclusively. E. C. Converse, Chairman; Horace Crosby, Treasurer and General Manager.
- Sable Iron and Nail Works, Zug & Co. Limited, Pittsburgh. Built in 1845; 34 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, (one 8, one 10, and one 16-inch, one universal mill, one 18-inch nail-plate mill, and 3 sets 3-high 20-inch muck train,) and 60 nail machines; product, merchant bar iron, including heavy sizes of flat bars and squares made on the universal rolls, fine grade horse-shoe bar, and iron and steel nails; annual capacity, 125,000 kegs of nails and 20,000 net tons of rolled iron. Natural gas used exclusively for fuel. Brand, "Sable." Charles H. Zug, Chairman; A. F. Keating, Treasurer; T. C. Clarkson, Secretary. Eastern sales agents, E. T. Day, New York, and William M. Horne & Co., Boston.
- Singer, Nimick & Co. Limited, Pittsburgh. Built in 1848; 8 single puddling furnaces, 8 converting furnaces, 12 steam hammers, one train of muck rolls, 4 trains of bar rolls, 5 trains of sheet rolls, and one 10-gross-ton Siemens open-hearth steel furnace; 258 pots can be used at each heat in crucible steel works; total annual ingot capacity, 23,000 net tons; product, tool, saw, boiler, and agricultural steel; also, carriage springs and axles and cold-rolled steel. Fuel used, natural gas exclusively. W. H. Singer, Chairman; George Singer, Jr., Secretary and Treasurer. General agents for the Eastern States, Hogan & Son, 243 Pearl st., New York.
- Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 34 single puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (12, 16, 18, 24, and 30-inch); product, bars, angles, sheets and plates, and light T rails; boiler plates a specialty; make "Sligo" bars and "Tyrone" refined iron; boiler heads and flue holes flanged to order; annual capacity, 16,000 net tons. Fuel used, natural gas exclusively.
- Soho Iron Mills, Moorhead & Co., Pittsburgh. Built in 1859; 12 knobbling fires, 21 single puddling furnaces, 2 scrap furnaces, 4 single and 3 double heating furnaces, 4 sheet furnaces, 4 pair furnaces, 5 annealing furnaces, one 6-tuyere refinery, 9 trains of rolls, (include a train

capable of rolling plates 12 inches thick, 8 feet wide, and 15 tons in weight,) and 2 hammers; product, "C. H. B." galvanized iron, Juniata, charcoal, and common sheet and plate iron; annual capacity, 13,000 net tons. Open-hearth steel department contains two 15-gross-ton open-hearth steel furnaces; first steel made November 29, 1883; product, steel plate; annual capacity, 15,000 net tons. Fuel used, natural gas exclusively.

Solar Iron and Steel Works, William Clark & Co., Pittsburgh. Built in 1869; 21 single puddling furnaces, 7 heating furnaces, and 6 trains of rolls (one 7-inch hoop, two 8-inch hoop, one 9 and one 12-inch bar, and one 20-inch muck); product, hoop, band, box, and scroll iron and steel, and cotton-ties; annual capacity, 15,000 net tons. Brands, "Solar" and "Clark." Fuel used, natural gas exclusively.

Spang Steel and Iron Company Limited, Pittsburgh. Works in Etna Borough. Built in 1880-1; three 10-gross-ton Siemens-Martin open-hearth steel furnaces, 7 heating furnaces, one hammer, and 4 trains of rolls (one 30-inch bloom, one 30-inch universal, one 18-inch bar, and one 112 x 31-inch plate); product, steel boiler, ship, and tank plates, and machinery and spring steel; annual capacity, 18,000 net tons. In course of erection, two 3-ton Clapp-Griffiths steel converters. Fuel used, natural gas exclusively. Hugh McNeil, Chairman; John C. Porter, Secretary and Treasurer; George A. Chalfant, General Manager; Walter E. Koch, Superintendent. Selling agents, William H. Wallace & Co., New York; George O. Wales & Co., Boston; J. W. Hoffman & Co., Philadelphia; Miller, Metcalf & Parkin, Chicago; and the L. M. Rumsey Manufacturing Company, St. Louis.

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

Sterling Steel Company Limited, 91 Fifth avenue, Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; two 24-pot Siemens steel-melting furnaces, 6 heating furnaces, and 4 hammers (800 to 2,500 pounds); product, fine crucible tool steel; annual capacity, 3,000 net tons. Brand, "Sterling." Use natural gas for fuel. Formerly called Pitt Steel Works, and then Crown Steel Works. C. Y. Wheeler, Chairman; William P. De Armit, Secretary and Treasurer. Selling agents in New York, Vought & Williams and S. A. Haines & Co.; Philadelphia, D. H. Corinth and Hand, Burr & Co.; Boston, McBarron & Co.; Baltimore, A. W. Smith & Co.; Chicago, S. D. Kimbark; Cincinnati, Thomas J. Bell & Co.; Louisville, H. U. Frankel; Pittsburgh, Boyle & Bissell.

Union Iron Mills, Carnegie Brothers & Co. Limited, Pittsburgh. Office and mills, Thirty-third st. Built in 1862; 38 single puddling furnaces,



13 single and 5 double Siemens heating furnaces, and 8 trains of rolls (one 8, one 12, four 18, and two 20-inch); product, iron and steel beams, channels, tees, angles, plates, and bars; and light steel rails; use natural gas for fuel exclusively; annual capacity of rolled iron and steel, 50,000 net tons. William L. Abbott, Superintendent; H. W. Borntraeger, Mill Manager. *See Edgar Thomson Steel Works. See Furnaces.*

United States Iron and Tin Plate Works, United States Iron and Tin Plate Company Limited, Demmler P. O., McKeesport, Allegheny county. Branch offices, 626 Liberty st., Pittsburgh, and 22 and 24 West Lake st., Chicago. Built in 1873-4; burned and rebuilt in 1883; 5 single puddling and 2 heating furnaces, 4 knobbling fires, 2 double sheet-mill furnaces, 3 annealing furnaces, 2 tinning stacks, (not in operation at present,) one hammer, one train of bar rolls, 2 trains of sheet rolls, and 2 sets of cold rolls; product, specialties in refined and charcoal polished black sheet iron and Bessemer steel sheets and plates; annual capacity for black plates and tin plates, 3,300 net tons. Black plates branded "U. S. A. M." and "J. H." Fuel used, natural gas exclusively. L. F. Demmler, Chairman; F. E. Schenck, Secretary and Treasurer; A. J. Demmler, Superintendent. Eastern agents, Ely & Williams, Philadelphia and New York.

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

Vulcan Forge and Iron Works, Long & Co., Pittsburgh. Works at Chartiers Station. Forge built in 1877; rolling mill built in 1882; 16 single puddling furnaces, 5 forge fires, 7 heating furnaces, 3 trains of rolls, (9, 15, and 18-inch,) and 4 hammers; product, bar iron, bridge iron, and iron and steel forgings, including axles; annual capacity, 10,000 net tons of finished rolled iron and 3,500 net tons of forgings. Brands, "Vulcan" and "L. & Co." Fuel used, natural gas exclusively.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1829; 28 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, 5 hammers, one 36-pot steel-melting furnace, seven 18-pot steel-melting furnaces, and one 45-ton cementing furnace; product, merchant bar iron, iron boiler plate, and rolled and hammered crucible steel; annual capacity, 15,000 net tons of iron and 7,000 net tons of crucible steel. Brands, "Wayne" and "U. S." Fuel used, natural gas exclusively.

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 55 completed and 2 building. Of these 13 are crucible steel



works, and one makes blister steel only; 4 produce Bessemer steel, and 2 are building Bessemer steel works; 12 make open-hearth steel, and 2 are building open-hearth steel works; one makes Clapp-Griffiths steel, and one is building Clapp-Griffiths steel works.

## PROJECTED.

Wassell Steel Company, Hamilton Building, Pittsburgh. Propose to erect a rolling mill to work old steel rails into plate and sheet steel.

## WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

Apollo Rolling Mills, Apollo Iron and Steel Company, Pittsburgh.

Works at Apollo, Armstrong county. Built in 1850; 6 single puddling furnaces, 3 bar furnaces, 4 heating furnaces, 5 annealing furnaces, one 5-ton hammer, and 8 pairs of rolls; two 15-gross-ton open-hearth steel furnaces, built in 1885-6, made first steel June 15, 1886; product, galvanized and smooth finished iron and steel sheets; annual capacity, 6,000 net tons. Brand, "Apollo." Fuel used, natural gas exclusively. George G. McMurtry, Chairman; Otis H. Childs, Secretary; W. P. Bache, Treasurer.

Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Pittsburgh office,

614 Liberty st. Built in 1886; 6 heating furnaces, 2 annealing furnaces, 2 sets of roughing rolls, 2 sets of finishing rolls, 2 sets of cold rolls, and one set of bar rolls; product, fine sheet iron and decarbonized sheet steel; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively. P. H. Laufman, Chairman; W. B. Laufman, Secretary and Treasurer; S. A. Gourley, Superintendent.

Beaver Falls Rolling Mill, Beaver Falls Iron Company, lessees, Beaver Falls, Beaver county. Built in 1879; 7 single puddling furnaces, 6

heating furnaces, 2 double annealing furnaces, 4 trains of rolls, (14 and 22-inch,) and one double-acting 5,000-pound hammer; product, fine sheet iron; annual capacity, 4,000 net tons. Fuel used, natural gas exclusively. N. E. Whitaker, President; H. C. Mechling, Vice-President; E. C. Ewing, Secretary.

Beaver Falls Steel Works, Beaver Falls, Beaver county. Built in 1875;

one 24-pot Siemens steel-melting furnace, one Siemens and 3 other heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 9 and one 16-inch); steam and water power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,600 net tons. Brand, "Beaver." Use natural gas for fuel. James M. May, Treasurer and Superintendent.

Burgess, (Charles,) Titusville, Crawford county. Built in 1879; rebuilt in

1884; 2 single puddling furnaces, one heating furnace, one 16-inch train of rolls, and 3 hammers; crucible steel department contains six 2-pot steel-melting holes; product, refined blooms, special tool steel, and a self-hardening tool steel. Fuel used, natural gas exclusively.

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

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

Columbia Iron and Steel Company, Pittsburgh. Works in course of erection in Fayette county; the steel plant will consist of two 5-gross-ton Bessemer steel converters and 2 soaking pits; the other machinery which will be added will be intended to work steel into structural shapes. C. Yeager, President; E. M. Butz, Vice-President and Treasurer; R. J. Butz, Secretary *pro tem*; F. A. Yeager, Superintendent.

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

Gautier Steel Department of Cambria Iron Company, (formerly Gautier

Steel Company Limited,) Johnstown, Cambria county. Works erected in 1878. Rolling mill has 6 trains of rolls, (two 9, two 12, and two 20-inch,) with full equipment of furnaces, shears, hammers, and special machinery; product, merchant bar steel of every size and for every purpose, the specialties being tire, spring, toe-calk, and plow steels; annual capacity, 30,000 net tons. Productions of separate departments: Plow shapes and slabs, annual capacity, 6,000 net tons; finished plow steels, 3,000 tons; elliptic carriage and railroad springs, 1,500 tons; harrow teeth, 500 tons; horse-rake teeth, 100,000 sets; steel finger-bars, 125,000 bars; cold rolled steel, 3,000 tons. The wire mill has an annual capacity of 30,000 net tons of fence wire alone; it produces all kinds of market wire—annealed, bright, coppered, tinned, and galvanized, for every purpose; also, telegraph and telephone wire. Expect to use natural gas for fuel after November, 1886. Branch offices, 104 Reade st., New York; 523 Arch st., Philadelphia; 202 First National Bank Building, Chicago.

Hartman Steel Company Limited, Beaver Falls, Beaver county. Built in 1883, and first put in operation September 1, 1883; 6 large heating furnaces; the merchant steel department contains 3 trains of rolls (9, 12, and 18-inch); the rod department contains 3 trains of rolls (18, 12, and 9-inch); product, merchant steel and wire rods; annual capacity, steel department, 30,000 net tons; wire rod department, 25,000 net tons. Wire mill attached has an annual capacity of 30,000 net tons. Also, wire-nail factory, steel sign and shafting works, steel wire-mat factory, etc. Fuel used, natural gas exclusively. H. W. Hartman, Chairman; G. H. Wightman, Secretary; R. A. Franks, Treasurer.

Kimberly (P. L.) & Co., Sharon, Mercer county. Three mills: Atlantic Iron and Nail Works, at Sharon, Mercer county, built in 1867; 32 puddling furnaces, 7 heating furnaces, 6 trains of rolls, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 20,000 net tons. New Castle Iron Works, at New Castle, Lawrence county, built in 1873; 3 double and 10 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, and one hammer; product, light and heavy sheet iron from hammered blooms; annual capacity, 6,000 net tons. Greenville Rolling Mill, at Greenville, Mercer county, built in 1871; 26 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, hoop and band iron; annual capacity, 12,000 net tons. Arrangements have been made to supply these works with natural gas for fuel. *See Shenango Valley Furnaces.*

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

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

Middlesex Rolling Mill, Carbon Iron Company of Pennsylvania, West Middlesex, Mercer county. Mill built in 1873; 16 single puddling furnaces, one Waplington regenerative gas heating furnace, 2 trains of rolls, and one 4-ton hammer; product, blooms for steel purposes, made by the Eames patent graphite process. Will use natural gas for fuel in the fall of 1886.

Myers (H. M.) & Co. Limited, Beaver Falls, Beaver county. Rolling mill built in 1883; 2 heating furnaces, 3 trains of 18-inch rolls, and 4 hammers; product, sheet steel, used by the firm in the production of shovels, spades, grain scoops, etc. Natural gas used for fuel exclusively.

Old Fort Iron Mills, Brownsville, Fayette county. Completed December 1, 1873; 8 single puddling and 3 heating furnaces, 2 trains of rolls, and one 5-ton steam hammer; product, sheet, bar, and guide iron and hammered blooms and billets; annual capacity, 6,000 net tons. Have been idle for several years.

Scottdale Iron Works, William H. Everson & Co., Scottdale, Westmoreland county. Branch office, Room 12, Lewis Block, Pittsburgh. Built in 1873; 8 single and 4 double puddling furnaces, 3 heating furnaces, 5 sheet furnaces, and 3 trains of rolls; product, muck bar and sheet iron; annual capacity, 8,000 net tons of muck bar and 3,000 net tons of sheet iron.

Sharon Iron Company, Sharon, Mercer county. Built in 1852; 11 double and 13 single puddling furnaces, 12 heating furnaces, 7 trains of rolls, (one 8, one 12, one 16, two 18, one 20, and one 24-inch,) and 64 nail machines; product, bar, band, hoop, tank, and sheet iron, light T rails, and iron and steel nails; annual capacity, 30,000 net tons, including 150,000 kegs of nails. Brand, "Shenango." Contemplate the erection of Bessemer steel works. C. H. Buhl, proprietor, Detroit, Michigan; Frank Buhl, General Manager, Sharon; David Adams, Secretary and Treasurer, Sharon. Selling agents, Buhl, Sons & Co., Detroit, Mich. *See Shenango Valley Furnaces.*

Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 15 single puddling furnaces, 2 heating furnaces, 2 hammers, (2½ and 5-ton,) and two trains of 3-high 18-inch rolls; product, muck bar and hammered blooms for steel purposes; annual capacity, 9,000 net tons. Will use natural gas for fuel in a short time.

Brand, "Stewart." David Stewart, Chairman, 119 Broadway, New York; Theodore F. Hicks, Secretary, New York; Gardner P. Lloyd, Treasurer, New York; Fayette Brown, General Agent, and H. H. Brown, Assistant General Agent, Cleveland; Samuel McClure, Agent, Sharon, Pa. *See Stewart Furnaces in Shenango Valley.*

West Penn. Steel Works, Jennings, Beale & Co., Stevenson Building, 43 Sixth ave., Pittsburgh. Works at Leechburg, Armstrong county. Built in 1881; one 10-gross-ton Siemens open-hearth steel furnace, one heating furnace, and one 8-ton hammer; rolling mill added in 1886, containing 9 heating furnaces, 2 annealing furnaces, and two 22-inch trains of rolls; product, fine sheet steel; annual capacity, 7,500 net tons. Fuel used, natural gas exclusively.

Wheatland Rolling Mills, Wheatland Bessemer Steel Company, Wheatland, Mercer county. Built to roll rails in 1872; 12 double puddling furnaces, 14 heating furnaces, and 3 trains of rolls. Owned by B. B. Reath, of Philadelphia. Idle for several years.

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 23 completed, and one building. Of these 2 make crucible steel, 4 make open-hearth steel, one makes Bessemer steel, and one is building Bessemer steel works.

Total number of rolling mills and steel works in Pennsylvania: 189 completed, and 6 building. Of these 21 make crucible steel; 22 make open-hearth steel, 3 are building open-hearth steel works, and one open-hearth steel plant is standing partly completed; 11 make Bessemer steel, and 3 are building Bessemer steel works; 4 make Clapp-Griffiths steel, and 2 are building Clapp-Griffiths steel works; one makes blister steel only, and 2 make special steel castings.

## DELAWARE.

Christiana Iron Works, Christiana Iron Company, Wilmington, New Castle county. Built in 1873-4; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 2 hammers; product, steel boiler plates.

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

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

Diamond State Iron Company, Wilmington. New York office, Duncan Building, 11 Pine st. Two mills: Diamond State Mill, built in 1853;

one single and 5 double puddling furnaces, one scrap furnace, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, and two 18-inch); product, merchant bar iron, fish-plates, railroad spikes, bolts and nuts, and bridge bolts; annual capacity, 14,000 net tons. Old Ferry Mill, built in 1868; 3 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls (two 9, one 16, and one 18-inch); product, horse shoes, fish-plates, and all kinds of bar iron; annual capacity, 16,000 net tons. Brand, "Diamond State." H. Mendinhall, President; Clement B. Smyth, Vice-President; George W. Todd, Secretary and Treasurer; John T. Davis, General Superintendent.

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

Marshallton Iron Works, John R. Bringham, Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884; 2 double puddling furnaces, 3 grate heating furnaces, 2 reverberatory heating furnaces, one English and one box annealing furnace, and 3 trains of rolls (one 20 and two 22-inch); steam and water power; product, sheet iron; annual capacity, 2,500 net tons. Brands, "Star" and "Delaware cleaned."

Minquas Iron Works, McCullough Iron Company, Wilmington. Built in 1873, and first put in operation in 1875; 6 single and 2 double puddling furnaces, 2 reverberatory heating furnaces, 3 grate heating furnaces, one annealing furnace, 5 trains of rolls, (two 16 and three 22-inch,) and one hammer; product, "Harvey's patent cleaned" sheet iron; annual capacity, 3,000 net tons. E. A. Harvey, President; Enoch McCullough, Vice-President; J. L. McDaniel, Secretary; Henry Whiteley, Treasurer. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. *See Rolling Mills in Maryland.*

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

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

Number of rolling mills in Delaware: 10.



## MARYLAND.

Abbott Iron Works, Abbott Iron Company, P. O. Box 65, Baltimore. Plate mills built in 1851; 6 double puddling and 8 heating furnaces, one hammer, and 5 trains of rolls; 2 sets of 3-high rolls, with facilities for rolling plates to 100 inches in width and girder plates 40 feet in length. Rail mill built in 1865; 17 double puddling and 10 heating furnaces, 2 trains of rail rolls, one hammer, and one train of bar rolls. Product of plate mills, boiler, tank, boat, still, car, and bridge plates; annual capacity, 10,000 net tons. Product of rail mill, iron rails and bar iron; annual capacity, 25,000 net tons. Charles H. Ashburner, President; J. S. Gilman, Vice-President and Treasurer. Works not in operation.

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

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

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

McCullough Iron Company, Northeast, Elkton, and Rowlandville, Cecil county. Three iron works in Cecil county: Northeast Works, at Northeast; West Amwell Works, at Elkton; and Octoraro Works, at Rowlandville. The Northeast Works were originally built in 1847; 4 single puddling and 6 heating furnaces, 5 trains of rolls, (two 16 and three 22-inch,) and 2 hammers; water and steam power; product, sheet iron for galvanizing, boiled iron of the kind called "Harvey's patent cleaned," and refined and best bloom bar iron; annual capacity, 3,000 net tons of sheet iron and 6,000 tons of refined and bloom bar iron. Brand, "McCullough's." A bloomery of 18 fires is also at Northeast, owned and operated by this company. The West Amwell Works have 3 heating furnaces, 2 trains of rolls, and smaller finishing machinery; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron; annual capacity, 1,000 net



tons. The Octoraro Works were originally built in 1829; 5 heating furnaces and 3 trains of rolls; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron, branded "Octoraro;" annual capacity, 2,000 net tons. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue: E. A. Harvey, President; Enoch McCullough, Vice-President; Joseph L. McDaniel, Secretary; Henry Whiteley, Treasurer. *See Rolling Mills in Delaware. See Bloomaries.*

Number of rolling mills and steel works in Maryland: 7. Of these one is a crucible steel works.

### 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; 3 scrap heating furnaces, 3 hammers, and one 19-inch train of rolls; product, bar, angle, and plate iron; annual capacity, 400 net tons. Forge and anchor shop, under same control and in same building, built in 1858; 3 large heating furnaces, 7 forge fires, and 3 hammers; product, heavy forgings, anchors, etc.

Number of rolling mills in District of Columbia: one.

### VIRGINIA.

Old Dominion Iron and Nail Works, Richmond, Henrico county. Works on Belle Isle. Improved and enlarged since 1865; 15 double and 10 single puddling furnaces, 5 heating furnaces, 2 gas heating furnaces with Siemens producer, 5 trains of rolls, and 100 nail machines; water and steam power; product, merchant bar iron, cut nails, spikes, and horse shoes; annual capacity, 12,000 net tons nails, 11,000 tons rolled iron. Brand, "Old Dominion." Propose to build a steel plant. R. E. Blankenship, President.

Tredegear Iron Works, Tredegear Company, Richmond. Built in 1836; one double and 23 single puddling furnaces, 13 heating furnaces, (including one Smith and 2 Siemens gas heating furnaces,) and 7 trains of rolls; water-power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, and horse shoes; annual capacity, 32,000 net tons. Foundry and machine shops, run by water-power, contain 3 air furnaces and 6 cupolas, have melting capacity of 150 tons per day, and make car-wheels, pipes, and machinery. Car shops, run by both water and steam power, can turn out 200 freight cars per month. Joseph R. Anderson, President; Archer Anderson, Treasurer; R. S. Archer, Superintendent rolling mills; F. T. Glasgow, Superintendent foundry and machine and car shops; J. F. T. Anderson, Jr., Secretary.

Virginia Nail and Iron Works, Virginia Nail and Iron Works Company, Lynchburg, Campbell county. Mill situated  $3\frac{1}{2}$  miles above

Lynchburg, on the Richmond and Alleghany Railroad. Built in 1867 and refitted in 1880; nail factory added in 1884; one single and 5 double puddling furnaces, 6 heating furnaces, 2 spike machines, 45 nail machines, and 3 trains of rolls (10, 18, and 20-inch); water-power; product, guide iron, round, square, and flat bar iron, light rails, nails, and spikes; annual capacity, 100,000 kegs of nails and 4,500 net tons of bar and guide iron. Brand, "Virginia." E. Schaefer, President; C. M. Blackford, Vice-President; J. P. Williams, Secretary, Treasurer, and Commercial Agent; T. C. Jones, General Manager.

Number of rolling mills in Virginia: 3.

### ALABAMA.

Anniston Rolling Mill, Noble Brothers & Co., Anniston, Calhoun county.

Built in 1884; 2 double puddling furnaces, 4 heating furnaces, one 22-inch train of rolls, and 3 hammers; product, car axles; annual capacity, 7,500 net tons.

Birmingham Rolling Mill Company, Birmingham, Jefferson county.

Main office, Louisville, Ky. Completed in July, 1880; 10 double and 3 single puddling furnaces, 7 annealing furnaces, 2 pair furnaces, and 6 trains of rolls (two 8, one 16, one 18, and two 24-inch); product, bar, angle, sheet, and plate iron, round-edge tire, small T rails, tram rails, and fish-plates; car iron a specialty; annual capacity, 35,000 net tons. James G. Caldwell, President; B. du Pont, Secretary; Thomas Ward, General Manager; J. D. Dwyer, Superintendent.

Brierfield Rolling Mill, Brierfield Coal and Iron Company, Brierfield, Bibb county.

Built in 1863, rebuilt in 1882-3, and put in operation in August, 1883; 4 double and 10 single puddling furnaces, 5 heating furnaces, three 18-inch trains of rolls, and 72 nail machines; product, nails; annual capacity, 175,000 kegs. (The works also contain a 9-inch merchant train of rolls, not in use.) T. J. Peter, President; John G. Murray, Secretary and Treasurer. *See Furnaces.*

Central Iron Works, Helena, Shelby county. Put in operation in March,

1873; 4 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 10 nail machines; product, merchant bar iron and nails; annual capacity, 1,000 net tons. Rufus W. Cobb, President; Burwell B. Lewis, Vice-President; Richard Fell, Jr., Secretary and Treasurer.

Number of rolling mills in Alabama: 4.

### TEXAS.

Houston Rolling Mills, Samuel Allen, Houston, Harris county. Built in

1884, and put in operation in May, 1884; 3 heating furnaces, 2 spike machines, and one 9 and one 16-inch train of rolls; product, light T rails, merchant bar iron, railroad spikes, fish-plates, and general railroad supplies; annual capacity, 5,000 net tons.

Number of rolling mills in Texas: one.

## WEST VIRGINIA.

- Belmont Nail Company, Wheeling, Ohio county. Built in 1849; 25 single puddling furnaces, (not now in use,) 3 regenerative gas heating furnaces, 4 forge fires, 2 trains of rolls, and 151 nail machines; product, nails exclusively, made from soft steel slabs; annual capacity, 350,000 kegs. A. Wilson Kelly, President; J. D. DuBois, Secretary and Treasurer; N. Riester, Superintendent. *See Furnaces.*
- Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. Built in 1852; burned in 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 173 nail machines; product, steel nails exclusively; annual capacity, 410,000 kegs. John G. Hoffmann, President; L. S. Delaplain, Vice-President; Alonzo Loring, Secretary; George Wise, Assistant Secretary. *See Miscellaneous Bituminous Furnaces in Ohio.*
- Crescent Iron Works, Whitaker Iron Company, Wheeling. Built in 1855; 15 double boiling furnaces, 3 heating furnaces, and 9 trains of rolls (pairs including bar and muck); product, sheet iron exclusively; annual capacity, 9,000 net tons. Expect to use natural gas for fuel after September 1, 1886. George P. Whitaker, President, Principio Furnace, Md.; N. E. Whitaker, Secretary, Wheeling.
- La Belle Iron Works, Wheeling. Built in 1852 and enlarged since; incorporated December 3, 1875; 23 single puddling furnaces, one coal and 2 regenerative gas heating furnaces, 2 trains of rolls, (20-inch muck and 24-inch 3-high plate,) and 142 nail machines; product, steel nails exclusively; annual capacity, 350,000 kegs. Brand, "La Belle." The puddling furnaces have not been used since 1884. H. M. Priest, President; C. A. Robinson, Secretary; William Hastings, Superintendent of forge; W. H. Travis, Superintendent of nail factory; W. H. Harden, Salesman.
- Moundsville Rolling Mill, Moundsville, Marshall county. Put in operation March 1, 1874; 12 single puddling furnaces, 4 heating furnaces, one scrap furnace, 3 trains of rolls, (one 8, one 16, and one 19-inch,) and 3 Kroman railroad spike machines; product, merchant bar and hoop iron of all sizes and railroad spikes; annual capacity, 8,000 net tons. Idle. Address Joseph D. Weeks, Pittsburgh, Pa.
- Riverside Iron Works, Wheeling. Built in 1859, enlarged since; 42 single puddling furnaces, 11 heating furnaces, 224 nail machines, one hammer, and 7 trains of rolls (one 9, one 12, two 20, two 21, and one 32-inch); product, bar steel, light T rails, skelp, tack plate, and steel nails exclusively; annual capacity, 10,000 net tons of finished bar steel, and 550,000 kegs of nails. Bessemer steel works built in 1883-4; two 5-gross-ton converters; first blow made June 11, 1884; product, steel, used for general purposes; annual capacity, 75,000 net tons of ingots. Brand, "Riverside." J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Furnaces in West Virginia and Ohio.*

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

Wheeling Steel Works, Wheeling. Works at Benwood, Marshall county. Built in 1885-6; first blow made August 9, 1886; two 5-gross-ton Bessemer converters, 2 soaking pits, one gas cobble furnace, and one 36-inch 2-high blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 110,000 net tons of ingots or 100,000 tons of slabs, blooms, and billets. Brand, "W. S. W." A. J. Clarke, President; Andrew U. Wilson, Secretary and Treasurer; W. I. Mann, General Superintendent.

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

## KENTUCKY.

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

Ewald Iron Company, 801 North Second st., St. Louis, Mo. Works at Tennessee Rolling Works P. O., Lyons county, and at Louisville, Kentucky. Works in Lyons county, built in 1846; 9 single puddling furnaces, 13 knobbling fires, 7 heating furnaces, 2 hammers, and 5 trains of rolls (8, 9, 16, 22, and 26-inch); product, boiler plate, sheet iron, bar and rod iron, and blooms; annual capacity, 4,000 net tons. Works at Louisville, formerly called Kentucky Rolling Mill, built in 1869; 19 single puddling furnaces, one scrap and 3 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, bar and guide iron; a heavy plate mill is to be added. L. P. Ewald, President; William Burg, Secretary.

Licking Iron Works, Licking Rolling Mill Company, Covington. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 2 scrap furnaces, 6 knobbling fires, one hammer, and 5 trains of rolls (one 8, two 16, one 20, and one 22-inch); product, merchant bar, bridge, boiler, and sheet iron, rivets, angle and tee iron, jail, sash, and corrugated roofing iron; annual capacity, 9,000 net tons; special products, boiler plate, shafting, charcoal bar, angle, and tee iron. I. Droege, President; F. J. Droege, Vice-President; John C. Droege, Treasurer; B. Macke, Secretary.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. Built in 1873; 4 knobbling, 10 puddling, 2 scrap, 2 slab, and 2 plate-mill furnaces, 2 annealing and 5 heating furnaces, 2 steam hammers, and 6 trains of rolls; one 7-gross-ton Siemens open-hearth steel furnace built in 1879; product, plate, sheet, channel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, 12,000 net tons. Brand, "O. V." Walter J. Mitchell, President; Charles J. Tranter, Vice-President; Frank P. Mitchell, Secretary; J. R. Williamson, Treasurer; James Tranter, Superintendent.

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

Swift's Iron and Steel Works, 26 West Third st., Cincinnati, Ohio. Works at Newport, Campbell county, Ky. Built in 1857; 29 single puddling and 14 heating furnaces, 3 box annealing furnaces, 4 forge fires, and 9 trains of rolls (8, 10, and 18-inch bar, 2 forge, 2 sheet, and 2 plate). Product: Swift's hammered soft flange boiler, flange sheet, and tank steel; bloom flange and C. H. No. 1 boiler, tank, and light and heavy sheet iron; bar, shafting, bridge, car, angle, tee, and other shapes, and mine T and street rails; annual capacity, 62,000 net tons. E. L. Harper, President; George E. Clymer, Vice-President; J. L. Pfau, Secretary; J. H. Mathews, Treasurer. *See Furnaces.*

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

## TENNESSEE.

Cherry, Morrow & Co., Nashville, Davidson county. Building a mill to roll merchant bar iron.

Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 9 single puddling furnaces, 3 heating furnaces, 41 nail machines, and 4 trains of rolls (8, 15, 16, and 18-inch); product, merchant bar, iron and steel nails, railroad and boat spikes, fish-plates, bolts, nuts, wrought washers, railroad, car, and miscellaneous forgings, and light T and street rails; annual capacity, 12,000 net tons, including 75,000 kegs of nails. W. R. Tuttle, President; W. S. Mead, Secretary and Treasurer.

Lookout Iron Company, P. O. Box G, Chattanooga. First started in October, 1876; 3 double puddling and 3 heating furnaces, and 3 trains of rolls (8, 16, and 18-inch); product, bar iron, 12 to 16-lb. T rails, and rail splices; annual capacity, 8,000 net tons. J. N. Hazlehurst, President and Manager; J. W. Thornton, Secretary and Treasurer.

Roane Iron Company, Chattanooga, Hamilton county. Rolling mill built in 1864; puddle mill built in 1869; 9 double puddling furnaces,

10 heating furnaces, one hammer, and 3 trains of rolls (two 18 and one 20½-inch); product, rails; annual capacity, 40,000 net tons. Open-hearth steel plant added in 1877-8; first cast made June 6, 1878; two 10-gross-ton Siemens furnaces; 12 gas producers; 36-inch Fritz blooming mill; product, steel for merchant and rail purposes. Building Bessemer steel works in 1886, to make steel rails. H. S. Chamberlain, President; H. Clay Evans, Secretary. *See Furnaces:*

Southern Steel Works, 641 Boyce st., Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883; one single puddling furnace, also used as a heating furnace, one 2,000-pound hammer, and one 4-pot steel furnace; product, best cast steel, suitable for machinery and edge tools, also crow-bars, crank pins, and piston rods. John W. Baker, President; John Leighton, Vice-President and General Manager; Arthur Leighton, Secretary and Treasurer.

South Tredegar Iron Company, Chattanooga. Main office, St. Louis, Mo. Built in 1866; 2 single and 4 double puddling furnaces, 7 heating furnaces, 74 nail machines, and 3 trains of rolls (one muck, one nail-plate, and one guide train); product, nails, railroad spikes, splice bars, and washers; annual capacity, 160,000 kegs of nails and 2,000 net tons of other products. Also, one 2-gross-ton Bessemer converter; made first blow April 19, 1886; product, steel for nail plate. H. L. Fox, President, St. Louis; C. E. Rubedeaux, Secretary; J. M. Duncan, Vice-President and Superintendent of works. Selling agent, John T. Fox. Number of rolling mills and steel works in Tennessee: 5 completed, and one building. Of these one makes open-hearth, one crucible, and one Bessemer steel, and one is building a Bessemer steel plant.

## OHIO.

### LAKE COUNTIES.

American Wire Company, Cleveland. Building a rolling mill; product, rods, to be drawn into wire.

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

Cleveland Hardware Company, Euclid Avenue Station, Cleveland. Built in 1879; one heating furnace and one 9-inch train of rolls; product, shapes for wagon hardware, rolled from muck bar; annual capacity, 2,500 net tons. L. McBride, President; A. W. Train, Secretary; S. E. Brown, Treasurer and Manager.

Cleveland Rolling Mill Company, Cleveland. Works principally located at Newburgh. Bessemer steel works built in 1867-8; made first blow

October 15, 1868; two 10-gross-ton converters; annual capacity, 150,000 net tons Bessemer steel ingots. Open-hearth steel works built in 1876-8; contain five Siemens-Martin furnaces—two 15-gross-ton and three 7-ton furnaces; annual capacity, 40,000 tons of open-hearth steel ingots. Rail mills built in 1857; 5 heating furnaces, one train of rolls, and blooming mill; annual capacity, 100,000 tons of rails. Three rod mills; 5 trains of rolls; annual capacity, 125,000 tons. Wire mills built in 1868; employ 1,500 men; annual output, 45,000 tons of finished wire. Plate mills consist of 6 single puddling furnaces and 4 trains of rolls (muck mill, 2 sheet mills, and plate mill); galvanizing works attached; annual capacity, 10,000 tons. The company also has a foundry, forge, machine shops, and blast furnaces. The works formerly operated by the Cleveland Iron Company, leased by the Cleveland Rolling Mill Company, consist of 19 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, and one hammer; annual capacity, 40,000 tons of iron rails and merchant bar iron. Product, wire, tire, and spring steel, hoops, wire rods, merchant steel, galvanized and black sheet iron, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, Bessemer steel rails, and iron rails. William Chisholm, President; W. B. Chisholm, Vice-President; E. S. Page, Secretary; John Walker, Superintendent. *See Furnaces.*

Forest City Iron Works, Atkins, Clark & Co., Cleveland. Built in 1866-7; remodeled in 1882; 17 single puddling and 4 heating furnaces, and 4 trains of rolls (7, 9, 12, and 18-inch); product, band and light bar iron; specialties, nut, bolt, and carriage iron; annual capacity, 12,000 net tons. Formerly part of the Union Iron Works.

H. P. Nail Company, Cleveland, Cuyahoga county. Built in 1880, and first put in operation in March, 1880; 2 heating furnaces, one 9-inch and one 18-inch train of rolls, and 125 wire-nail machines; product, steel wire nails, steel wire rods, and steel wire; annual capacity, 80,000 kegs wire nails and 20,000 net tons rods and wire. S. H. Chisholm, President; C. B. Beach, Vice-President; E. C. Beach, Secretary; M. Baackes, General Manager.

Lake Erie Iron Works, Lake Erie Iron Company, 104 and 106 St. Clair st., (office and warehouse,) Cleveland. Built in 1852; 16 single puddling and 19 heating furnaces, 4 trains of rolls, and 13 hammers; product, locomotive and car axles, iron and steel forgings of every description, iron shafting up to 20-inch round, and merchant bar iron; annual capacity, 19,000 net tons. Nut and bolt works recently added, producing 20 tons daily of nuts and bolts of every description used by railroads, car builders, and for agricultural implements. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; James E. Lewis, Superintendent.

Maumee Rolling Mill, Maumee Rolling Mill Company, Toledo, Lucas county. Built in 1883-4, and put in operation in the beginning of October, 1884; 8 double puddling furnaces, 6 forge fires, 10 heating furnaces, 7 trains of rolls, (one 3-high plate, two 40 x 22-inch sheet,



one 3-high 18-inch bar, one 3-high 18-inch forge, one 8-inch and one 10-inch hoop and band,) and one 5-ton hammer; product, sheet, angle, tee, hoop, tank, and merchant bar iron; annual capacity, 16,000 net tons. Brand, "Maumee." The mill is also designed for rolling steel. H. S. Walbridge, President; I. Droege, Sr., Vice-President and Manager; I. Droege, Jr., Secretary; T. H. Walbridge, Treasurer. Otis Iron and Steel Company, Cleveland. Built in 1873-4, and put in operation January 1, 1875; 2 rotary puddling furnaces, 7 Siemens heating furnaces, 4 hammers, four 15-gross-ton Siemens open-hearth furnaces, and 4 trains of rolls (one 10, one 20, and two 31-inch); product, steel plate, bar steel, and forgings; annual capacity, 20,000 net tons. Brand, "Otis steel." Two 5-gross-ton converters, for the production of Bessemer steel, have since been added; first blow made August 5, 1884; product, steel for wire rods; annual capacity, 20,000 net tons. Charles A. Otis, President; Thomas Jopling, Treasurer; J. K. Bole, Secretary; S. T. Wellman, Superintendent.

Union Rolling Mill Company, 122 Water st., Cleveland. Works at Newburgh. Built in 1866-7; 16 single puddling and 6 heating furnaces, and 3 trains of rolls (8, 9, and 18-inch); product, bar iron, angles, fish-plates, shafting, and light T and street rails; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 110 net tons of finished iron. S. W. Sessions, President; A. S. Upson, Vice-President; A. R. Treadway, Secretary; S. A. Fuller, General Manager and Treasurer; Charles Kennedy, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Lake region: 10 completed and one building. Of these 2 make Bessemer steel and 2 make open-hearth steel.

#### MAHONING VALLEY.

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

Cuyahoga Iron and Staybolt Company, Cuyahoga Falls, Summit county. Built in 1865; rebuilt in 1884; 2 heating furnaces, and one 8-inch and one 20-inch train of rolls; product, Ostrander's patent mandrel-rolled hollow bar iron and staybolt iron, also extra refined iron; annual capacity, 1,000 net tons.

Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863 and 1874; 31 single puddling furnaces, 8 heating furnaces, and 6 trains of rolls (one 6, one 7, two 8, one 10, and one 16-inch); product, hoops, bands, horse-shoe iron, bar iron, guide iron, and cotton-ties; annual capacity, 30,000 net tons. Brands,

"C, McC. & Co." and "Eagle." Putting up 6 regenerative gas furnaces, and intend soon to introduce natural gas for fuel. Myron C. Wick, President; H. O. Bonnell, Vice-President; W. E. Taylor, Secretary and Treasurer.

Falcon Iron and Nail Works, Falcon Iron and Nail Company, Niles, Trumbull county. Built in 1867; 15 single puddling and 5 heating furnaces, one box annealing furnace, 44 nail machines, and 3 trains of rolls (two 20 and one 22-inch); product, nails and sheet iron; annual capacity, 200,000 kegs of cut nails and 2,500 net tons of sheet iron. Brand, "Falcon." John Stambaugh, President; Warner Arms, Vice-President; Myron I. Arms, Secretary and Treasurer. *See Russia Sheet-Iron Mills.*

George Summers' Sons, Niles, Trumbull county. Built in 1841; 16 single puddling and 7 heating furnaces, one pair furnace, 2 annealing furnaces, and 5 trains of rolls; product, plate and sheet iron (common, refined, and Juniata); annual capacity, 10,000 net tons. Formerly part of the works of James Ward & Co. George Summers, Sr., General Manager; George Summers, Jr., General Agent.

Hall Iron Works, Jesse Hall & Son, Hubbard, Trumbull county. Put in operation in November, 1872; one double and 10 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, 6,000 net tons.

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

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Built in 1846; 42 double and 40 single puddling furnaces, 19 heating furnaces, 50 nail machines, 6 spike machines, and 13 trains of rolls (two 8, two 10, one 12, one 18, two 20-inch, one sheet, and 4 muck); product, merchant bars, I beams, channels, angles, universal-mill plates, angle splices, railroad links and pins, washers, special shapes for agricultural implements, sheets, nails, and railroad and boat spikes; annual capacity, 130,000 kegs of nails and 68,000 net tons of other products. Brand, "Mahoning." Incorporated in September, 1875. D. B. Chambers, Receiver's Agent; John I. Williams, General Manager. *See Furnaces.*

Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; one single and 28 double puddling furnaces, 12 heating furnaces, 6 trains of rolls, and 55 nail machines; product, merchant bar iron, angles, sheet iron, and nails; annual capacity, 50,000 net tons; also make "Acme" polished shafting; daily capacity, 10 tons. Formerly called Valley Iron Works, afterwards

Ridgway Iron Works, and originally built to make rails. *See Mahoning Valley Furnaces.*

Russia Sheet-Iron Mills, Falcon Iron and Nail Company, lessees, Niles, Trumbull county. Built in 1864; 9 single puddling furnaces, one scrap furnace, 6 heating furnaces, 2 box annealing furnaces, and 3 trains of rolls; product, sheet iron. Formerly part of the works of James Ward & Co. *See Falcon Iron and Nail Works.*

Summers Iron Works, Summers Bros. & Co., Struthers, Mahoning county. Built in 1881-2; 2 double and 2 single puddling furnaces, one pair furnace, 2 heating furnaces, 3 patent box annealing furnaces, and 2 trains of rolls; product, light sheet iron; annual capacity, 2,300 net tons. Brands, "S. B. & Co." and "Struthers." James Summers, President and General Manager; H. Paterson, Vice-President; William Summers, Secretary; S. Summers, Treasurer.

Trumbull Iron Company, Girard, Trumbull county. Built in 1872 by Girard Rolling Mill Company; put in operation September 1, 1873; purchased by the present company in 1878; 17 single puddling furnaces, 2 Smith regenerative gas heating furnaces, and 3 trains of rolls; product, all sizes of merchant bar and small T rails; special attention given to the manufacture of irons for agricultural implements, guard and finger iron, drag and brace bars, knife-back iron, cylinder-bar and tooth irons for threshers, chain, bolt, and nut iron; annual capacity, 10,000 net tons. Henry Wick, President; John C. Wick, Vice-President; Myron C. Wick, Secretary; G. D. Wick, Treasurer and General Manager.

Youngstown Rolling Mill, Youngstown Rolling Mill Company, Youngstown. Built in 1871; burned and rebuilt in 1877; 21 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls (7, 10, 12, and 20-inch); product, hoop, band, hame, box, pole-cap, and tire iron and steel, and cotton-ties; annual capacity, 10,000 net tons. Paul Wick, President; Thomas H. Wells, Vice-President; Henry Wick, Secretary and Treasurer.

Youngstown Steel Company, Youngstown, Mahoning county. Built in 1882-3, and put in operation in March, 1883; one 20-gross-ton Siemens open-hearth steel furnace; one 10-ton Pernot revolving furnace for dephosphorizing metal by the Krupp-Bell process; product, ingots, billets, and steel castings; annual capacity, 10,000 net tons. John Stambaugh, President; George Tod, Vice-President; John Stambaugh, Jr., Secretary and Treasurer; Tod Ford, Business Manager; E. L. Ford, Superintendent.

Number of rolling mills and steel works in the Mahoning region: 14. Of these one is an open-hearth steel works.

#### INTERIOR COUNTIES.

Canton Steel Works, Bolton Steel Company, Canton, Stark county. Built in 1872; 10 heating furnaces, 3 welding furnaces, 4 hammers, one 12-inch and one 20-inch train of rolls, and one 10-gross-ton Sie-

- mens open-hearth steel furnace; first open-hearth steel made August 17, 1875; product, tool steel, machinery steel, cast steel, and spring steel; annual capacity, 3,350 net tons of steel ingots. Brand, "Canton." Ogden Bolton, President; R. H. Bulley, Vice-President and Treasurer.
- Champion Steel and Iron Works, Springfield, Clark county. Building a rolling mill, to contain 9, 12, and 15-inch trains, and to roll machinery steel for Whitely, Fasler & Kelley's use in making agricultural implements.
- Cherry Valley Iron Works, Leetonia, Columbiana county. Formerly called Leetonia Iron and Coal Company. Built in 1871; one double and 16 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, muck bar, merchant bar, and guide iron; annual capacity, 10,000 net tons. J. H. King, President; C. N. Schmick, Secretary and Treasurer; J. G. Chamberlain, Superintendent. Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Furnaces.*
- Columbus Iron Works, P. Hayden Saddlery Hardware Company, Columbus, Franklin county. Built in 1854; 7 single and 3 double puddling furnaces, 7 heating furnaces, one hammer, and 4 trains of rolls; product, merchant bars, light T rails, wire rods, and iron for harness and saddlery work and for all kinds of chains; annual capacity, single turn, 5,000 net tons.
- Columbus Steel Company, Columbus, Franklin county. Original works built to roll rails in 1872; changed to steel works in 1886; building two 15-gross-ton open-hearth furnaces; product, blooms, billets, and slabs; annual capacity, 20,000 net tons. E. L. Hinman, President; H. D. Turney, Vice-President; W. S. S. Rodgers, Secretary and Treasurer; James Whyte, Superintendent of works.
- Dover Rolling Mill, Reeves Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6; first iron rolled in February, 1866; 12 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (8, 10, and 20-inch); product, all kinds of small merchant iron and light T rails; annual capacity, 9,000 net tons. Jeremiah Reeves, General Manager; Jabez Reeves, Superintendent.
- Massillon Rolling Mill, Joseph Corns & Son, Massillon, Stark county. Built in 1873, and put in operation January 4, 1875; 8 single puddling furnaces, 2 heating furnaces, and one 9-inch and one 18-inch train of rolls; product, best common and refined bar iron; specialty, iron for agricultural implements; special shapes to pattern; annual capacity, 6,000 net tons.
- New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Built in 1883; 20 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, sheets and plates. Jeremiah Reeves, President; George Reeves, Secretary and Treasurer.
- Solid Steel Company, Alliance, Stark county. One 3-gross-ton open-hearth steel furnace, built in 1883; first steel cast in August, 1883;

product, steel castings; annual capacity, 1,800 net tons. T. R. Morgan, Sr., President; S. J. Williams, Secretary and Treasurer; C. W. Roep-per, Superintendent.

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

Zanesville Iron Works, Ohio Iron Company, Zanesville, Muskingum county. The first mill of these works was built in 1848; present company was incorporated in 1857, and has operated the works since then; now comprise 22 single puddling furnaces, 2 scrap furnaces, 7 heating furnaces, one hammer, 2 spike machines, and 5 trains of rolls (two 8, one 10, one 16, and one 18-inch); product, assorted merchant bar iron, light T and street rails, and railroad spikes; specialty, agricultural irons; annual capacity, 14,000 net tons. Adding one 10-gross-ton open-hearth steel furnace, to be completed by September 1, 1886. M. Churchill, President; C. W. Greene, Secretary and Treasurer; A. F. Cassel, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in Central Ohio: 9 completed, and 2 building. Of these 2 make open-hearth steel, and 2 open-hearth steel works are building.

#### OHIO RIVER COUNTIES.

Ætna Iron and Steel Company, Bridgeport, Belmont county. Built in 1873, and put in operation January 1, 1874; enlarged in 1883; 32 single puddling furnaces, one scrap furnace, 16 heating furnaces, 4 annealing furnaces, and 8 trains of rolls (one 8, one 9, one 16, one 18, three 20, and one 22-inch); product, iron and soft steel bars, sheets, plates, and bands, and light T and street rails; annual capacity, 20,000 net tons. Will use natural gas for fuel exclusively after September 1, 1886. W. H. Tallman, President; John A. Topping, Secretary; Lewis Jones, Manager.

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

Bellaire Nail Works, Bellaire, Belmont county. Built in 1867, and put in operation in February, 1868; 4 heating furnaces, 2 trains of rolls, and 125 nail machines; product, steel nails and spikes; annual capacity, 370,000 kegs. Bessemer steel works built in 1883-4; two 5-gross-ton converters, 2 heating furnaces, and a blooming mill; first blow made April 28, 1884; product, principally soft steel slabs for nail plate and billets; daily capacity, 250 to 300 net tons. Will use natural gas after September 1, 1886. J. R. McCortney, President; A. D. Hilborn, Secretary; James Wilson, Salesman. *See Furnaces.*

Burgess Steel and Iron Works, Portsmouth. Built in 1871; 9 single puddling furnaces, 12 heating furnaces, one 24-pot Siemens crucible steel-melting furnace, one 8-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, (one 8, one 18, and one 20-inch,) and 5 steam hammers; product, plow steel, (Siemens-Martin, puddled, German, and iron-centre crucible cast,) tool steel, steel and iron boiler plate, "U. S. Norway" refined iron, blooms, five-ply safe steel, and cold-compressed shafting; annual capacity, 7,000 net tons. George Davis, President; L. C. Robinson, Vice-President; E. N. Hope, Secretary and Treasurer; L. D. York, Superintendent.

Cartwright Iron and Steel Company, Steubenville, Jefferson county. Works formerly known as the Alikanna Rolling Mill, built in 1871-2; 12 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 8 and one 16-inch); product, hoops, bands, cotton-ties, and horse-shoe bar. James Cartwright, President; Frank B. Davis, Secretary.

Co-operative Nail Works Company, Steubenville, Jefferson county. Built in 1885-6; use purchased nail plate; first nail made February 15, 1886; 18 nail machines. Building a rolling mill, to make nail plate. B. F. Prentiss, President; W. J. Verner, Vice-President; James Mafion, Secretary.

Crescent Iron Works, Pomeroy, Meigs county. Built in 1847; 3 double and 11 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls; product, band, hoop, and refined iron; annual capacity, 6,000 net tons. Formerly called Pomeroy Iron Works. Idle.

Globe Rolling Mill Company, offices at 163 and 165 West Pearl st., Cincinnati. Mill at 413 West Front st., built in 1845; 9 single puddling furnaces, 3 scrap furnaces; 4 heating furnaces, 3 knobbling fires, 5 trains of rolls, (two 8-inch guide, one 14-inch bar, one 18-inch sheet, and one 20-inch muck bar,) and one 2-ton hammer; product, bar, angle, sheet, and plate iron; annual capacity, 7,000 net tons of bar iron and 1,500 net tons of sheet and plate iron; also produce wire rods and wire; annual capacity, 1,200 net tons of wire. Brand, "Globe." Boring a well for natural gas. Joseph Kinsey, President; Jacob Walter, Vice-President; L. F. Phipps, Secretary; James Bryan, Superintendent.

Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Branch office, 106 Third avenue, Pittsburgh, Pa. Built in 1875; bought and refitted by present owners in 1886; one heating furnace, one scrap furnace, 2 sheet furnaces, one pair furnace, one annealing furnace, one bar mill, and one 22-inch train of sheet rolls; product, sheets for galvanizing, elbow sheet iron, show card sheets, and sheet steel specialties; annual capacity, 1,800 net tons. John C. Wallace, Chairman; H. T. Duff, Secretary; William Banfield, Treasurer and Manager.

Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton, Lawrence county. Built in 1852, and enlarged several times

since; 21 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, sheet and plate iron, merchant iron, and light rails; annual capacity, double turn, 13,000 net tons. C. H. Bliss, President; J. H. Kean, Vice-President; J. H. Montgomery, Secretary and Treasurer; B. M. Caldwell, Manager.

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 14 single puddling furnaces, 3 gas heating furnaces, 2 trains of rolls, (muck and 21-inch nail plate,) and 136 nail machines; product, exclusively steel nails; annual capacity, 340,000 kegs. Brand, "Jefferson." Building Bessemer steel works in 1886, to consist of two 3-gross-ton converters, to make steel for nails. Natural gas will shortly be used for fuel exclusively; the puddling furnaces are to be wholly abandoned. W. H. Wallace, President; Calvin B. Doty, Vice-President; G. P. Harden, Secretary; W. H. McClinton, Manager of nail factory. *See Furnaces.*

Junction Iron Company, Wheeling, W. Va. Works at Mingo Junction, Jefferson county, Ohio. Built in 1882, and put in operation November 1, 1882; 4 Smith heating furnaces, 2 trains of rolls, and 126 nail machines; product, steel cut nails and spikes, made from steel furnished by the Laughlin and Junction Steel Company; annual capacity, 350,000 kegs. Brand, "Junction Iron Co." Samuel Laughlin, President; George A. Laughlin, Secretary and Treasurer. *See Furnaces.*

Kelly Nail and Iron Company, Ironton, Lawrence county. Built in 1883, and first put in operation November 1, 1883; 16 double puddling furnaces, 3 heating furnaces, and 100 nail machines; product, iron and steel cut nails and spikes; annual capacity, 250,000 kegs. William D. Kelly, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer.

Laughlin and Junction Steel Company, Wheeling, W. Va. Works at Mingo Junction, Ohio. Built in 1885-6; two 5-gross-ton Bessemer converters; made first blow February 8, 1886; 4-hole soaking pit, 4-door gas heating furnace, and blooming mill; product, slabs, billets, and blooms for general purposes; annual capacity, 75,000 net tons. Samuel Laughlin, President; W. L. Glessner, Vice-President; Alexander Glass, Secretary.

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Built in 1873-4; first keg of nails made March 4, 1874; works destroyed by fire August 8, 1881, but immediately rebuilt; 3 gas heating furnaces, one train of 20-inch rolls, 2 hammers, and 192 nail machines; product, steel nails, made from steel supplied by the Laughlin and Junction Steel Company; annual capacity, 500,000 kegs. Will use natural gas for fuel after September 1, 1886. W. L. Glessner, President.

Lawrence Iron Works, Lawrence Iron Works Company, Ironton. Built in 1853; 19 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 8, one 9, one 16, and one 18-inch); product, bar, band,



chain, spike, and hoop iron of every variety, cotton-ties, and light T rails from 8 to 30 lbs.; annual capacity, 10,000 net tons. Specialties, chain iron, iron fencing, concave tires, and cotton-ties. Cyrus Ellison, President; James Thomas, Vice-President; F. C. Tomlinson, Secretary and Treasurer; George T. Scott, General Superintendent. Selling agents, The Hazen Company, Cincinnati.

Norway Rolling Mill Company, 227 Main st., Cincinnati. Works on East Front st.; formerly known as Cincinnati Rolling Mills. Built in 1864, enlarged in 1881, and rebuilt in 1886; 5 single puddling and 3 heating furnaces, one 31-inch 3-high plate mill with 2 stands of rolls, two 21-inch bar trains, and one 10-inch train; product, plate and bar iron and steel, and special horse-shoe and carriage irons; annual capacity, 12,000 net tons. R. H. Sellew and C. H. Townley, proprietors. W. H. Carruthers, General Manager.

Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth, Scioto county, Ohio. Built in 1832; 19 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 2 hammers; iron products, boiler plate, tank plate, sheet iron, bar and hoop iron, railroad spikes, small T rails, splice bars, and bolts; annual capacity, 11,000 net tons. One 10-gross-ton Siemens open-hearth steel furnace, built in 1879; steel products, boiler plate, spring steel, agricultural steel, tire steel, machinery steel, etc.; annual capacity, 4,500 net tons ingots. Idle and for sale.

Riverside Iron and Steel Company, 26 West Third st., Cincinnati. Rolling mill at Riverside, Hamilton county. Built in 1880; greatly enlarged in 1882; 10 single puddling furnaces, 8 heating furnaces, 3 box annealing furnaces, pair furnaces, one 4-ton hammer, one muck and billet train, one plate train, (with one set 7-foot and one set 62-inch chill rolls,) and 2 sheet trains; specialty, flange bloom boiler plate and heads, boiler steel, tank iron, and light and heavy sheet iron; annual capacity, 12,000 net tons of boiler and tank iron, boiler steel, and heavy sheet iron, and 40,000 bundles, or 3,000 net tons, of light sheet iron. Boring a well for natural gas. W. P. Harris, President; A. P. Gahr, Secretary and Treasurer.

Spaulding Iron Company, Brilliant, Jefferson county. Rolling mill started in September, 1883, and first nails cut January 1, 1884; 20 single puddling furnaces, 4 heating furnaces, 4 trains of rolls, one hammer, and 76 nail machines; product, nails; annual capacity, 228,000 kegs. D. Spaulding, President; C. H. Spaulding, Vice-President and Secretary; Thomas B. Taylor, Superintendent.

Standard Iron Company, Bridgeport, Belmont county. Built in 1882-3, and put in operation April 1, 1883; 9 single puddling furnaces, 4 heating furnaces, and 6 trains of rolls (five 20 and one 22-inch); product, sheet iron and sheet steel, plain or corrugated; annual capacity, 6,000 net tons. Natural gas will be used for fuel after September 1, 1886. L. S. Delaplain, President; W. T. Graham, Secretary.

Standard Nail Works, Standard Nail and Iron Company, Middleport,

Meigs county. Built at Clifton, West Virginia, in 1867, removed to present site in 1885, and commenced to make nails in new factory February 22, 1886; 3 heating furnaces, one 20-inch train of rolls, and 102 nail machines; product, steel nails; annual capacity, 250,000 kegs. Brand, "Standard." Charles H. Greene, President; William S. Green, Secretary and Treasurer; Lemuel Swift, Superintendent. Selling agents, King, Gilbert & Warner, Columbus.

Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Main office at 111 Water st., Pittsburgh, Pa. Mill built in 1873 to make tinplate; remodeled in 1880 by present owners; 8 single puddling furnaces, 2 heating furnaces, 4 pair and sheet furnaces, 3 annealing furnaces, and two 22-inch trains of rolls; product, plate and sheet iron; annual capacity, 3,000 net tons. Fuel used, natural gas exclusively. P. F. Smith, President and Manager; Richard G. Wood, Vice-President; Alan W. Wood, Secretary and Treasurer.

Number of rolling mills and steel works in the Ohio river counties: 22 completed, and one building. Of these 2 make open-hearth steel, 2 make Bessemer steel, one makes crucible steel, and one Bessemer steel works is building.

Total number of rolling mills and steel works in Ohio: 55 completed, and 4 building. Of these 4 make Bessemer steel, 7 make open-hearth steel, and one makes crucible steel; one is building Bessemer steel works, and 2 are building open-hearth steel works.

## INDIANA.

Ætna Iron and Steel Works, 184 and 186 Washington st., Chicago, Illinois. Works at Crown Point, Lake county, Indiana, built in 1886; one one-ton Bessemer converter, one cementing furnace, crucible steel department with one hole, and one small open-hearth steel furnace; product, steel castings, architectural and building work, beams, girders, etc.; also, steel heating furnaces for buildings. Jean L. Pfau, President; J. Louis Pfau, Jr., Secretary and Manager; T. A. Muzzall, Superintendent.

Central Iron and Steel Company, Brazil, Clay county. Built in 1882-3, and first put in operation January 12, 1883; 8 double puddling furnaces, 7 heating furnaces, 3 trains of rolls, (one 10 and two 20-inch,) and two 4-ton hammers; product, merchant bar iron, light T rails, car axles, and forgings; special attention given to car and bridge specifications; annual capacity, 10,000 net tons. Brand, "Central." Major Collins, President and Manager; Charles Minshall, Secretary and Treasurer. *See Furnaces.*

Chicago Steel Manufacturing Company, First National Bank Building, Chicago, Illinois. Works in course of erection at Hammond, Lake county, Indiana; three 15-gross-ton open-hearth steel furnaces, 22-inch slab train, 22-inch nail-plate train, and 150 nail machines; product, steel nails exclusively. Marcus M. Towle, President, Hammond;

- J. T. Torrence, Vice-President and Manager, Chicago; George W. Hoffman, Treasurer, Chicago.
- Cobb's Iron and Nail Company, Aurora, Dearborn county. Built in 1875-8; 4 heating furnaces, one 20-inch train of rolls, and 50 nail machines; product, square cut nails, produced from Cobb's patent nail-plate pile of wrought-iron scrap and old iron or steel rails, and cut on the Haddock automatic machine; annual capacity, 150,000 kegs. Brand, "Cobb's Wrought-Iron Square Cut Nails." (Also have nut, bolt, and washer machinery, not now in operation.) O. P. Cobb, President; John Cobb, Vice-President; Frank D. Cobb, Secretary and Treasurer; W. H. Cobb, Assistant Secretary; John Black, Superintendent.
- Greencastle Iron and Nail Company, Greencastle, Putnam county. Put in operation in January, 1868; 4 double and 8 single puddling furnaces, 3 heating furnaces, one annealing furnace, two 18-inch trains of rolls, and 45 nail machines; product, iron nails and spikes; annual capacity, 100,000 kegs. J. F. Darnall, President; H. M. Thomas, Superintendent of works; G. H. Brown, Secretary and Treasurer. Selling agent, E. A. More, St. Louis.
- Indianapolis Rolling Mills, Indianapolis Rolling Mill Company, Indianapolis, Marion county. Built in 1857; 4 double and 2 single puddling furnaces, 8 heating furnaces, and 3 trains of rolls; product, light and heavy rails; annual capacity, 30,000 net tons. Finishing part of steel rail mill built in 1881-2, but not yet put in operation; capacity, 300 net tons of steel rails in twenty-four hours. Open-hearth steel works in course of erection, to contain two 15-gross-ton Siemens furnaces, to make steel for rails and other products; expect to erect 2 more furnaces soon. Aquilla Jones, President; John Thomas, Treasurer; W. H. Thomas, Assistant Treasurer; S. W. Morgan, Secretary and Superintendent.
- New Albany Rail Mill Company, New Albany, Floyd county. Built in 1864; 5 double and 6 single puddling furnaces, 5 forge fires, 11 heating furnaces, 3 spike machines, and 4 trains of rolls; product, iron T rails, (8 to 65 lbs.,) tram rails, street rails, bars, angles, fish-plates, spikes, washers, etc.; steel slot beams for cable roads a specialty; annual capacity, 35,000 net tons. W. C. DePauw, President; C. W. DePauw, Vice-President; Albert Trinler, General Manager.
- Ohio Falls Iron Works, New Albany, Floyd county. Built in 1866; 15 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (8-inch guide, 16-inch bar, and 18-inch muck); product, bridge, bar, plow, and stay-bolt iron; annual capacity, 10,000 net tons. W. C. DePauw, President; Peter R. Stoy, Vice-President, Secretary, Treasurer, and General Manager.
- Terre Haute Iron and Nail Works, Terre Haute, Vigo county. Built in 1868; destroyed by fire September 19, 1873, but rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double and 16 single puddling furnaces, 2 scrap furnaces, 4 heating furnaces, 144 nail machines,

and 2 trains of rolls; product, iron and steel nails; annual capacity, 400,000 kegs. Brands, "Terre Haute," "Superior," and "Selected." F. Nippert, President; S. L. Bridwell, Secretary; H. S. Deming, Treasurer.

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

Number of rolling mills and steel works in Indiana: 9 completed, and one building. Of these one makes Bessemer, open-hearth, and crucible steel; 2 are building open-hearth steel works.

## ILLINOIS.

Belleville Nail Company, Belleville, St. Clair county. Part of this plant was built at St. Louis, Mo., by the Bogy Nail Works, and removed to Belleville in 1869; works were completed in 1869-70; one single puddling furnace, 2 forge fires, 5 heating furnaces, 2 trains of rolls, and 80 nail machines; product, cut nails; annual capacity, 175,000 kegs. Bessemer steel works in course of construction, to contain two 3-gross-ton converters, to make steel for nails. James Waugh, President; W. W. Waugh, Vice-President; J. C. Waugh, Jr., Secretary; R. F. Waugh, Treasurer.

Belleville Steel and Iron Nail Works, Belleville. Built in 1885-6; 2 heating furnaces, one 22-inch train of rolls, and 60 nail machines; product, iron and steel nails. James M. Hay, President; George H. Owen, Secretary; B. Hartmann, Treasurer.

Calumet Works, Calumet Iron and Steel Company, First National Bank Building, Chicago. Works at Cummings, Cook county. First put in operation in August, 1876; 24 double puddling furnaces, 2 scrap and 5 heating furnaces, 4 trains of rolls, (9, 14, 20, and 22-inch,) and 132 nail machines; operated with the Siemens gas furnace; product, merchant bar iron and iron and steel nails; annual capacity, 20,000 net tons of bar iron and 300,000 kegs of nails. Four 4-gross-ton open-hearth steel furnaces added in 1882; made first steel in October, 1882; product, steel for nails, merchant bar, and steel castings; annual capacity, 20,000 net tons. Brand, "Calumet." D. P. Eells, President; R. H. Lewis, Vice-President and General Manager; John M. Brown, Secretary and Treasurer. *See Furnaces.*

Centralia Iron and Nail Works, Centralia, Marion county. Built in 1878, and put in operation in March, 1879; 2 heating furnaces, 52 nail machines, and 2 trains of rolls (18 and 19-inch); product, steel nails; annual capacity, 140,000 kegs. (Also, 12 single puddling furnaces, not now in use, except one as a scrap furnace and one as an annealing furnace.) S. M. Warner, President; E. S. Condit, Vice-President; A.

D. Bailey, Secretary ; F. Kohl, Treasurer ; M. H. Monkhouse, Superintendent.

Chicago Forge and Bolt Company, 234 South Clark st., Chicago. Rolling mill built in 1886 ; one heating furnace and one 8-inch train of rolls ; product, small rounds and flats. A. Egerton Adams, President ; Frederick M. Steele, Secretary ; Francis King, Treasurer ; C. Neatherson, Superintendent.

Chicago Splice-Bar Mill, Morris Sellers & Co., 6 Ashland Block, Chicago. Built in 1878 ; one forge fire, 2 heating furnaces, and 2 trains of rolls ; product, "Samson" splice bars ; annual capacity, 6,000 net tons. Howard Greer, Superintendent.

Chicago Steel Works, 806 Noble st., Chicago. Built in 1873 ; 9 heating furnaces, 3 forge fires, and 2 trains of 14-inch rolls ; manipulate Bessemer steel rail ends ; product, tires, plow beams, harrow teeth, springs, steel cultivator sleeves, shovel backs, and squares, diamonds, ovals, tees, and a variety of other shapes for agricultural implements ; annual capacity, 6,000 net tons. C. P. Buckingham, President ; E. Buckingham, Vice-President ; J. H. Buckingham, Secretary and selling agent ; E. H. Buckingham, Treasurer and Superintendent.

Chicago Tyre and Spring Works, 94 Washington st., Chicago. Works at Melrose, Cook county. Rolling mill built in 1881-2 ; one heating furnace and one train of tire rolls ; product, steel locomotive tires made from imported blooms. Spring works have furnaces, rolls, and machinery for railroad springs. F. M. Atkinson, President.

Crucible Steel Company, 46 West Monroe st., Chicago. Works put in operation in November, 1885 ; 5 four-pot steel-melting holes ; product, crucible steel castings ; daily capacity, 3,200 pounds. C. N. Peirce, President ; A. H. Peirce, Vice-President ; J. S. Brown, Secretary and Treasurer ; William Chambers, Superintendent.

Fowler Rolling Mill, Fowler Rolling Mill Company, 185 Dearborn st., Chicago. Built in 1882 ; one forge fire, 2 heating furnaces, and one 9-inch train of rolls ; product, "Fowler" railroad spikes ; annual capacity, 80,000 kegs. Sidney A. Kent, President ; William J. Watson, Vice-President ; H. W. Fowler, Secretary, Treasurer, and General Manager.

Haxtun Steam Heater Company, Kewanee, Henry county. Built in 1883, and put in operation in November, 1883 ; 4 double-double puddling furnaces, 2 heating furnaces, two 16-inch trains of rolls, and one 5,000-pound hammer ; product, skelp iron, used by the company in the manufacture of steam-heater pipe ; annual capacity, 15,000 net tons. The company also manufactures everything used in the construction of steam-heating apparatus for buildings of every description. W. E. Haxtun, President ; J. H. Pierce, Secretary ; E. E. Baker, Treasurer.

Joliet Steel Works, Joliet Steel Company, Home Insurance Building, Chicago. Works at Joliet, Will county. Built in 1870 ; steel works made first blow January 26, 1873, and the first steel rail March 15,

1873; the converting department has two 8-gross-ton converters; annual capacity, 210,000 net tons of Bessemer steel ingots. Steel rail mill has 6 heating furnaces, one 36-inch blooming train, one 23-inch rail train, and a Sellers 3-ton hammer; annual capacity, 185,000 net tons of Bessemer steel rails. Alexander J. Leith, President, 11 Pine st., New York City; J. C. Stirling, Secretary, Chicago; W. R. Stirling, Treasurer, Chicago; H. S. Smith, General Superintendent, Joliet. *See Furnaces.*

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 37 Mitchell Block, Milwaukee, Wis. Two plants in Illinois, styled the Chicago Works and the South Chicago Works. Chicago Works, W. L. Potter, General Superintendent, located at Chicago, on the north branch of the Chicago river, at the foot of Waubansia avenue, built in 1857; one sextuple and 8 quadruple puddling furnaces, equal to 38 single furnaces, 23 heating furnaces, 10 trains of rolls, and one hammer; Bessemer steel works have two 6-gross-ton converters and all the appliances for making rails; made their first blow April 10, 1872; first steel rail rolled May 24, 1865, from steel made at Wyandotte, Michigan; product, Bessemer steel ingots, iron and Bessemer steel rails, and steel beams; annual capacity, 156,000 net tons ingots, 125,000 tons steel rails, 60,000 tons iron rails, and 50,000 tons steel beams, (which latter would come out of rail capacity.) South Chicago Works, E. C. Potter, Superintendent, located at South Chicago, made their first blow June 14, 1882; contain three 10-gross-ton Bessemer converters, 4 Siemens heating furnaces, one 3-high 40-inch blooming train, and one 2-high reversing finishing train of rolls; product, Bessemer steel ingots and rails; annual capacity, 330,000 net tons ingots and 300,000 tons rails. All rails branded with the company's initials. This company has 3 rail mills, one merchant mill, and 8 blast furnaces. O. W. Potter, President, Chicago; Nathaniel Thayer, Vice-President, Boston, Mass.; R. C. Hannab, Secretary, Chicago; John C. Parkes, General Manager. General office, Chicago. *For details in addition to this description see Illinois Furnaces and Wisconsin Furnaces and Rolling Mills.*

Plano Steel Works, Plano, Kendall county. Built in 1885; 2 heating furnaces and one 16-inch train of rolls; product, steel wheels, wrought-iron and steel shapes, and cast-iron specialties for agricultural implements. Albert H. Sears, President and General Manager; William Taylor, Vice-President; W. G. Coolidge, Secretary; E. L. Henning, Treasurer.

Pullman Iron and Steel Company, Pullman, Cook county. Built in 1883-4; 2 forge fires, 9 Swindell gas heating furnaces, 3 trains of rolls, (8, 10, and 18-inch,) 4 spike machines, and one 3-ton steam hammer; product, car and merchant iron, "bayonet" railroad spikes, and special shapes of iron and steel; annual capacity, 25,000 net tons of car and merchant iron and 60,000 kegs of spikes. Frank B. Felt, Secretary and Treasurer.

Rock Island Arsenal, Rock Island, Rock Island county. One heating furnace, one 5,000-pound hammer, and one 14-inch train of rolls; product, bar iron, light T rails, shafting, and heavy forgings. Built to dispose of accumulated wrought-scrap iron and to furnish material needed in the construction of the arsenal.

Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield, Sangamon county. Chicago office, 115 Dearborn st. Puddle mill first put in operation in June, 1872; 8 double puddling furnaces and one 18-inch train of rolls. Rail mill put in operation in September, 1872; 6 Siemens heating furnaces and one 23-inch train of rolls; product, steel and iron rails; annual capacity, 60,000 net tons; this mill is at present idle, owing to condition of trade. Bar mill put in operation in November, 1878; 5 Siemens heating furnaces and 2 trains of rolls (12 and 16-inch); product, bar iron, fish-plates, and merchant steel; annual capacity, 20,000 net tons. Steel-melting house built in 1879; two 20-gross-ton Siemens-Pernot open-hearth steel-melting furnaces, and one Pernot furnace and 2 cupolas for dephosphorizing pig metal by the Krupp process; made the first steel ingot February 9, 1880; annual capacity, 20,000 net tons. Blooming mill contains a stand of 30½-inch rolls, with hydraulic tables attached, and 2 Siemens heating furnaces. Plate mill with one 22-inch train and full plant of shears put in operation in January, 1883; product, light steel sheets and plates; annual capacity, 9,000 net tons. Boiler plate mill put in operation in August, 1884; one 31-inch train of rolls, 112 inches in length, with tilting tables on each side. Charles Ridgely, President; William Barret Ridgely, Vice-President; Franklin Ridgely, Secretary; John Griffiths, Superintendent. Selling agent, B. L. Keen, 115 Dearborn st., Chicago.

Tudor Iron Works, Third and St. Charles sts., St. Louis, Mo. Works at East St. Louis, St. Clair county, Ill. Put in operation in January, 1873; one single and one double puddling furnace, one scrap furnace, 8 heating furnaces, 4 trains of rolls, (one 8, one 9, and two 16-inch,) 6 spike machines, 2 bolt headers, 4 bolt cutters, 2 nut tappers, and 5 nut machines; reroll Bessemer steel; product, railroad splices, T rails, bolts, and spikes; annual capacity, 35,000 net tons. Brand of spikes, "Tudor." T. A. Meysenburg, President; B. S. Adams, Secretary; George S. Edgell, Treasurer.

Union (The) Steel Company, 302 First National Bank Building, Chicago. Works at 3,179 Ashland avenue; original mill built in 1863; original Bessemer steel works made their first blow July 26, 1871; Bessemer steel works and rail mill rebuilt in 1885-6; two 10-gross-ton converters, 4 cupolas, 4 spiegel cupolas, 35-inch 3-high blooming mill, 2 ingot-heating gas furnaces, one bloom-heating gas furnace, and one 25-inch 3-high rail train; product, Bessemer steel rails. (Also, merchant bar, plate, rod, and wire mills; 7 heating furnaces, one 22-inch plate mill, one 20-inch billet mill, one 18-inch bar mill, and one wire-rod mill; not now in use.) Jay C. Morse, President; H. A. Gray,



Secretary and Treasurer; Robert Forsyth, Manager; Robert Spencer, General Agent. *See Furnaces.*

Western Forge and Rolling Mills, East St. Louis. Forge built in 1885; 6 fires, 3 heating furnaces, and 3 hammers; product, all descriptions of iron and steel forgings. Rolling mill to be built in 1886. John Wilson, President and General Manager; George S. Foster, Vice-President; J. Wilson, Jr., Secretary.

Western Nail Company, Belleville, St. Clair county. Rolling mill and nail works first put in operation in September, 1882; steel works made first blow January 21, 1886; two 3-gross-ton Clapp-Griffiths steel converters, 2 ordinary heating furnaces, one Smith gas heating furnace, one 23½-inch slab train, one 21-inch 3-high nail-plate train, and 154 nail machines; product, steel nails; annual capacity, 25,000 net tons steel ingots and 350,000 kegs of nails. W. H. Powell, President and General Manager; C. Reinecke, Vice-President and Treasurer; H. L. Powell, Secretary; E. B. Powell, Superintendent of works.

Western Steel Company, 58 Dearborn st., Chicago. Works at Parkside, Cook county. Built in 1881; 4 heating furnaces, one train of rolls, and 2 hammers; product, "Seymour" rolled steel horse shoes; annual capacity, 1,500 net tons. James D. Sturges, President; J. W. Helmer, Secretary and Treasurer; J. C. Blewett, Superintendent; George R. French, General Agent.

Number of rolling mills and steel works in Illinois: 22. Of these 4 make Bessemer steel, 2 make open-hearth steel, one makes crucible steel, one makes Clapp-Griffiths steel, and one is building Bessemer steel works.

## MISSOURI.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Built in 1879; 3 single puddling furnaces, 2 Siemens and 2 coal heating furnaces, 10 charcoal knobbling fires, 3 trains of rolls, and 3 hammers; product, stamping sheet iron for "granite iron ware" and galvanizing sheet; annual capacity, 5,000 net tons. F. G. Niedringhaus, President; William F. Niedringhaus, Secretary and Manager.

Harrison Wire Company, 816 High st., St. Louis. Built and started in 1873; one 2½-ton steam hammer, 5 heating furnaces, one 2-high 18-inch train of rolls, and one rod train; daily capacity, 40 net tons of rods. Wire department has 350 blocks; daily capacity, 100 net tons. Annealing and galvanizing departments attached. Idle.

Helmbacher Forge and Rolling Mills Company, corner Barton and De Kalb sts., St. Louis. Works, South Second st., between Lami and Barton sts. Built in 1858; 7 single puddling furnaces, 10 heating furnaces, 2 trains of rolls, (one 10 and one 19-inch,) and 11 hammers (ranging from 8-ton double-acting to 60-pound helve); product, bar, rod, band, and angle iron, car axles, coupling links and pins, light T rails from 8

to 20 lbs., and all kinds of iron and steel forgings for railroad and steamboat use, and for machine shops; specialties, shafts, railroad car axles, links, and pins; annual capacity, 6,000 net tons of axles and forgings, and 6,000 tons of bar iron, links, and pins. A. Helmbacher, President and Treasurer; M. Helmbacher, Vice-President and Superintendent; G. L. Goetz, Secretary. Agents, John S. Brewer, 158 Lake st., Chicago; H. C. McNair, Drake's Block, St. Paul, Minn.

Laclede Rolling Mills, Chouteau, Harrison & Vallé Iron Company, 941 North Second st., St. Louis. Built in 1850; rebuilt in 1879; 20 single puddling furnaces, 4 Siemens and 5 coal heating furnaces, one scrap furnace, 4 knobbling fires, 5 trains of rolls, (one 8, one 16, two 22, and one 26-inch,) 2 hammers, 2 bolt headers, 2 spike machines, 4 screw cutters, 2 machines for making washers, and 2 nut tappers; product, bar, sheet, and plate iron, plate and sheet steel, blooms, angle and tee iron, 8 to 25-lb. T rails, 20 to 50-lb. flat rails, spikes, nuts, bolts, and washers; also cold-rolled sheet iron; annual capacity, 20,000 net tons. C. C. Maffitt, President; Edwin Harrison, Vice-President; Paul A. Fusz, Secretary.

La Grange Rolling Mills, La Grange, Lewis county. Built in 1883; 2 Siemens gas puddling furnaces, 2 Siemens double heating furnaces, and 3 trains of rolls (one 16 and two 22-inch). For sale or rent. M. J. Sheridan, proprietor, 22 and 24 Pacific avenue, Chicago.

St. Louis Steam Forge and Rolling Mills, A. McDonald & Brother, corner Main and Miller sts., St. Louis. Built in 1862; 3 double puddling furnaces, 6 forge fires, 8 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 6 hammers; product, bar iron, car axles, and forgings; annual capacity, 12,000 net tons car axles, and 2,500 tons bar iron.

Vulcan Works, Western Steel Company, lessees, St. Louis. Works at South St. Louis. Built in 1872 as an iron rail mill; Bessemer steel works erected in 1875-6; made their first blow September 1, 1876; two 7-gross-ton converters, 4 pig-iron cupolas, 4 spiegel-melting furnaces, 40 gas producers, 10 Siemens heating furnaces, one 3-ton hammer, one 33-inch blooming train, one 24-inch rail train, and one 24-inch billet train; product, steel slabs, blooms, rails, and billets; annual capacity, 100,000 net tons ingots. A. M. Wilcox, President and Treasurer; C. F. Stuart, Secretary; Wm. White, Jr., Superintendent. *See Furnaces.* Number of rolling mills and steel works in Missouri: 7. Of these one makes Bessemer steel.

## IOWA.

Burlington Rolling Mill Company, Burlington, Des Moines county.

First put in operation in 1885; 2 Swindell gas heating furnaces and 2 trains of rolls (9 and 16-inch); use scrap iron only; product, all sizes of merchant bar iron—rounds, half rounds, squares, flats, and bands; annual capacity, 3,000 net tons. John H. Gear, President; J. W. Price, Vice-President; John G. Foote, Secretary and Treasurer.

Number of rolling mills in Iowa: one.

## MICHIGAN.

Baugh Steam Forge Company, No. 1 Newberry and McMillan Building, Detroit, Wayne county. Works at Springwells, about three miles west of Detroit. Forge built in 1870, rolling mill in 1877; 12 heating furnaces, 5 hammers, and 3 trains of rolls (9, 16, and 20-inch); product, car axles, links, and pins, shafting, and bar iron. James McMillan, President; Hugh McMillan, Vice-President; John B. Baugh, General Manager; Samuel A. Baugh, Superintendent; W. K. Anderson, Treasurer; R. D. Field, Secretary.

Detroit Steel and Spring Works, First and Larned sts., Detroit. First put in operation in May, 1882; 7 Swindell and 4 double Weber heating furnaces, 2 trains of rolls, (one 9 and one 18-inch,) and 8 hammers; product, steel shapes, rolled from purchased steel; annual capacity, 8,000 net tons. Crucible steel department added in 1884; first steel made in February, 1884; one Siemens gas pot furnace and six steel-melting holes; 30 pots can be used at each heat in steel works; product, tools and springs; annual capacity, 1,500 net tons. Alexander De Lano, President; Charles P. Choate, Vice-President; H. R. Newberry, Secretary and Treasurer.

Eureka Iron and Steel Works, No. 21 Newberry and McMillan Building, Detroit. Works and main office at Wyandotte, Wayne county. Built in 1855; 5 double and 5 single puddling furnaces, 12 forge fires, 11 heating furnaces, 6 trains of rolls, (one 8, one 10, one 18, one 20, one 24, and one 30-inch,) and one 5-ton hammer; product, "Wyandotte" boiler plate and tank iron, and bars; annual capacity, 9,000 net tons plates and 24,000 tons bars. Formerly called Wyandotte Rolling Mills. W. K. Muir, President, Detroit; S. D. Miller, Vice-President and Secretary, Detroit; George Hendrie, Treasurer, Detroit; J. S. Van Alstyne, Agent, Wyandotte; Thomas D. Evans, Superintendent of mill. *See Furnaces.*

Number of rolling mills in Michigan: 3. Of these one makes crucible steel.

## WISCONSIN.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Ill., and 37 Mitchell Block, Milwaukee, Wis. Milwaukee Works at Bay View, near Milwaukee, Milwaukee county. W. B. Parkes, Superintendent. Built in 1868 and 1874; 8 quadruple puddling furnaces, 19 coal and 5 Siemens heating furnaces, 7 trains of rolls, (one 8, one 9, one 12, two 18, one 21, and one 22-inch,) and one hammer; product, rails, merchant bar iron, fish-plates, car links and pins, and horse shoes; annual capacity, 50,000 net tons of bar iron and rails, and 25,000 tons of fish-plates, etc. Nail mill added in 1884; 100 nail machines; product, iron and steel nails; annual capacity, 300,000 kegs. *See Furnaces. See Illinois Furnaces and Rolling Mills.*

Number of rolling mills in Wisconsin: one.

## MINNESOTA.

Northwestern Iron Works, Morgan, Williams & Co., Minneapolis, Hennepin county. Built in 1885-6; one heating furnace, one double busheling furnace, and one 16-inch train of rolls; product, bar iron, made from scrap iron; annual capacity, 6,000 net tons. D. Morgan, Manager.

Standard Rolling Mill, Strothman Brothers, Minneapolis, Hennepin county. Built in 1884, and first put in operation July 1, 1884; one heating furnace and one 8-inch train of rolls; product, flat, round, and square bar iron; annual capacity, 1,200 net tons. Operated in connection with the Standard Iron Works machine shop.

Number of rolling mills in Minnesota: 2.

## KANSAS.

Western Iron Company, Rosedale, Wyandotte county. Built in 1875; 11 heating furnaces, 2 hammers, one nut and 6 spike machines, 3 trains of rolls, (9, 18, and 20-inch,) and a set of universal rolls attached to the 20-inch train; product, mine and street rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc.; annual capacity, 15,000 net tons. James H. Anderson, President, Keokuk, Iowa; A. St. J. Newberry, Secretary and Treasurer, Cleveland, Ohio; D. E. Jones, Superintendent, Rosedale.

Number of rolling mills in Kansas: one.

## NEBRASKA.

Union Steel Nail Company, Omaha, Douglas county. Works built in 1877; first started by present company May 25, 1886; 2 heating furnaces, 2 trains of rolls, (18 and 22-inch,) and 32 nail machines; product, "Union" nails, made from blended steel and iron; annual capacity, 100,000 kegs. George T. Walker, President; William Haven, Vice-President; W. N. McCandlish, Secretary.

Number of rolling mills in Nebraska: one.

## COLORADO.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. Works at Denver, Arapahoe county, and at South Pueblo, Pueblo county. The works at Denver consist of a rolling mill purchased of the Denver Rolling Mill Company in 1880, having been built in 1878; 5 heating furnaces and 2 trains of rolls; product, bar iron, iron rails, and splice bars; annual capacity, 12,000 net tons. The works at South Pueblo consist of Bessemer steel works, steel rail mill, puddle mill, merchant bar mill, and nail factory; built in 1881-2; converting department made its first blow April 11, 1882; two 5-gross-ton Bessemer steel converters, 4 Siemens heating furnaces, one 3-high 35-inch

blooming train, one 3-high 23-inch rail train, 3 Siemens double-double puddling furnaces, one 20-inch muck train, one 19-inch bar train, one 9-inch guide train, and one 2-high 22-inch nail-plate train, heating and annealing furnaces, 27 nail machines, and railroad spike and bolt and nut machines; product, steel rails, bar iron, mine rails, splice bars, steel cut nails, railroad spikes, bolts, nuts, and cast iron pipe; annual capacity, 50,000 net tons of steel rails, 12,000 net tons of bar iron, mine rails, and splice bars, 100,000 kegs of nails, and 30,000 kegs of railroad spikes, bolts, and nuts. Henry E. Sprague, President, New York City; A. H. Danforth, Vice-President and General Manager, South Pueblo; W. L. Graham, Secretary and Treasurer, South Pueblo; W. G. Brown, Sales Agent, Denver; D. N. Jones, General Superintendent of steel works, South Pueblo. *See Furnaces.*

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

### WYOMING TERRITORY.

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

Number of rolling mills in Wyoming Territory: one.

### CALIFORNIA.

Anglo-Pacific Steel Works, San Francisco. Building a rolling mill to work imported crude steel into merchantable shapes.

Central Pacific Railroad Rolling Mill, Central Pacific Railroad Company, Sacramento, Sacramento county. Built in 1881; 9 heating furnaces, 3 trains of rolls, and 7 hammers; product, all kinds of bar and shaped iron; annual capacity, 8,000 net tons. Brand, "C. P. R. R." A. J. Stevens, General Manager of the mill.

Judson Manufacturing Company, Oakland, Alameda county. Built in 1882; 4 heating furnaces and 2 trains of rolls (one 10 and one 16-inch); product, bar iron and tack plate; annual capacity, 6,000 net tons. Brand, "Judson." Egbert Judson, President; D. Henshaw Ward, Vice-President and General Manager; C. B. Morgan, Secretary; First National Bank, Treasurer. Sales are made by the San Francisco office and by Sutton & Beebe, Portland, Oregon.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Cable address, "Nails." Works at Oakland, Alameda county. Commenced operations May 1, 1883; 3 forge fires, 4 heating furnaces, one train of 3-high 14-inch rolls, one train of rolls for nail plate, one hammer, 96 nail machines, and 4 wire-nail machines; product, wire nails and cut

nails; annual capacity, 275,000 kegs. Make nails of blended or combined iron and steel as well as of iron alone. Hermann J. Sadler, President and Treasurer; P. A. Wagner, Vice-President; C. J. R. Buttlar, Secretary; William Wright, General Agent.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 16 First st., P. O. Box 2,032, San Francisco. Put in operation July 25, 1868; 4 single puddling and 17 heating furnaces, 6 trains of rolls, (one 8, one 10, one 12, and three 18-inch,) 4 spike and 2 rivet machines, 4 bolt headers, one pointer, 5 hot-press nut machines, 10 punching and straightening presses, 8 steam hammers, and 2 belt hammers; product, bar iron, angle iron, shafting, 12 to 60-lb. iron and steel rails, railroad, ship, and boat spikes, bridge work, bolts, (all kinds except carriage,) nuts, washers, boiler rivets, horse-shoe shapes, car axles, and all kinds of railroad and ship forgings; total annual capacity, 30,000 net tons. Open-hearth steel department added in 1884; one 5 and one 18-gross-ton Siemens-Martin furnace; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. A horse-shoe company has been formed to be run in connection with these works, and of which this company holds control. William Alvord, President; L. B. Benchley, General Manager; C. M. Keeney, Secretary; Patrick Noble, Superintendent.

Number of rolling mills in California: 4 completed, and one building. Of these one makes open-hearth steel.

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## UNITED STATES.

Total number of rolling mills and steel works in the United States: 423 completed, and 13 building. Of these 42 make open-hearth steel, 7 are building open-hearth steel works, and one open-hearth steel plant is standing partly completed; 40 make crucible steel; 27 make Bessemer steel, and 7 are building Bessemer steel works; 6 make Clapp-Griffiths steel, and 2 are building Clapp-Griffiths steel works; 2 make blister steel; and 2 make special steel castings. A rolling mill in the United States may embrace one or more trains of rolls under one management.

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## RECENTLY ABANDONED ROLLING MILLS.

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### MAINE.

Pembroke Iron Works, Pembroke, Washington county. Built prior to 1854; product, bars, bands, nails, and skelp iron. For sale in 1886.

## VERMONT.

St. Albans Iron and Steel Works, St. Albans, Franklin county. Built in 1873; product, iron and open-hearth steel rails. Dismantled in 1885.

## MASSACHUSETTS.

Newton Iron Works, Newton Upper Falls, Middlesex county. Built about 1800; product, bar and rod iron; abandoned in 1880.

Tisdale Nail Works, East Wareham, Plymouth county. Built in 1836; product, bar iron, nails, and tack plate.

United States Navy Yard, Charlestown, Middlesex county. Mill built in 1868; product, bar iron.

## RHODE ISLAND.

Providence Iron Company, Providence. Built in 1845; abandoned in 1880.

## CONNECTICUT.

Greenwich Iron Works, James S. Lounsbury, Mianus, Fairfield county. Built in 1835; product, round and square rods.

Hunt Canfield Iron Company, Huntsville, Litchfield county. Destroyed by fire, and not rebuilt.

Stillwater Iron Works, Stillwater Company, Stamford, Fairfield county. Built in 1835; product, round and square rods.

## NEW YORK.

Auburn Rolling Mill, E. D. Clapp Manufacturing Company, Auburn, Cayuga county. Built in 1880, and burned January 4, 1886; product, merchant bar, all used by the company in the manufacture of carriage hardware and farm wagons and other vehicles.

Buffalo Iron and Nail Works, Buffalo, Erie county. Built in 1847; abandoned in 1880.

Delano Iron Works, Syracuse, Onondaga county. Built in 1865; product, rails, fish-plates, spikes, and merchant bar iron. Dismantled in 1878.

Lake Champlain Nail Works, Dannemora, Clinton county. Built in 1853; abandoned in 1877.

Napanoch Rolling Mill, Napanoch Rolling Mill Company, Napanoch, Ulster county. Started up in February, 1880, after 8 years' idleness. Idle since May, 1881, and dismantled.

Peru Steel and Iron Company, Clintonville, Clinton county. Built in 1824; 2 heating furnaces and 3 trains of rolls.

Rome Iron Works, Rome Iron Works Company, Rome, Oneida county. Built in 1866 to make rails, and afterwards used to make bar iron.

Samsondale Iron Works, Haverstraw, Rockland county. Built in 1832. Removed to Duncansville, Pa., in 1884.

Skaneateles Iron Works, Skaneateles Falls, Onondaga county. Built in 1868; abandoned in 1880.



Suffern, (James,) Suffern P. O., Rockland county. Built in 1850; product, bars.

Troy Wire Mills, Troy. One 6-inch mill built in 1874, but only used for a short time; dismantled.

#### NEW JERSEY.

Bergen Iron Works, Jersey City. Built in 1852; product, plate iron and blooms. Dismantled in 1879.

Camden Rolling Mill, Camden, Camden county. Annual capacity, 12,000 net tons of bar iron and 75,000 kegs of nails.

Collier's Iron Works, William Collier, Paterson, Passaic county. Built in 1872; product, merchant bar and horse-shoe iron.

Elizabethport Rolling Mill, Elizabethport, Union county. Built about 1870; product, bar and angle iron, fish-plates, and spikes. Machinery removed in 1885.

North River Rolling Mill, Alexander C. Durbin, Thirteenth and Henderson sts., Jersey City. Product, fire-box and boiler plate; annual capacity, 3,000 net tons. Dismantled in 1875.

Rockaway Rolling Mill, Rockaway, Morris county. Built in 1822. Burned in 1883.

#### PENNSYLVANIA.

Brady's Bend Iron Company, Brady's Bend, Armstrong county. Built in 1842; product, rails. Dismantled in 1879.

Colemanville Rolling Mill, Colemanville, Lancaster county. Burned in 1875.

Danville Rolling Mill, Danville. Built in 1870; removed to Chester, Delaware county, in 1881.

Erie Rolling Mill, Erie, Erie county. Built in 1872; destroyed by fire December 9, 1883.

Harrisburg Steel and Iron Works, Hummel, Fendrich & Co., Harrisburg. First put in operation October 16, 1881; product, horse-shoe steel and iron, wagon and carriage tire, nut, bolt, and rivet iron, and other specialties. Dismantled in 1885, and machinery taken to Columbia, Lancaster county.

Hibernia Forge and Rolling Mill, Wagontown, Chester county. Forge built in 1792; mill added in 1837; abandoned in 1880.

Lehigh and Franklin Wire Mills, Stewart & Co., Easton, Northampton county. Rolling mill built in 1837; product, wire rods, drawn into wire at the same establishment. Rolls removed in 1884.

Mount Carbon Rolling Mill, Mount Carbon, Schuylkill county. Bar and plate mill. Burned in May, 1879.

Palo Alto Rolling Mill, Pottsville, Schuylkill county. Built in 1854; product, rails, fish bars, and bar iron. Dismantled in 1886.

Philadelphia Iron and Steel Company, 939 North Delaware avenue, Philadelphia. Built in 1845; product, bar, angle, and tee iron, fish-plates, and peculiar shapes. Dismantled in 1886.

Shenango Iron Works, New Castle, Lawrence county. Built in 1848;

product, bars, light T rails, sheets, bands, wrought spikes, and nails. Dismantled in 1885; nail machines taken to Youngstown, Ohio. Superior Rolling Mill, Pittsburgh. Built in 1865 to make rails; altered to make iron and steel structural material. Dismantled in 1886. West Brandywine Iron Works, Coatesville, Chester county. Built in 1845; abandoned in 1880.

## MARYLAND.

Baltimore Steam Forge and Rolling Mills, Trego, Thompson & Co., Baltimore. Built in 1853; product, bar iron and car axles. Canton Iron Works, Canton, Baltimore county. Built in 1878; product, refined merchant bar iron. Dismantled in 1885. Mount Savage Iron Company, Mount Savage, Alleghany county. Built in 1839. Dismantled in 1875.

## VIRGINIA.

Graham's Forge, Wythe county. Built in 1828; product, bar iron and nails. Abandoned in 1881. Lynchburg Iron Works, Lynchburg, Campbell county. Built in 1872; product, merchant bar and band iron, bolts, and nuts.

## GEORGIA.

Georgia Iron Works, Atlanta, Fulton county. Built in 1865-6; product, iron rails and bar iron. Burned September 21, 1881, and the machinery sold and removed. Rome Iron Works, Empire Iron Company, Rome, Floyd county. Built in 1869; product, bar iron and nails. Dismantled in 1881.

## KENTUCKY.

Central Rolling Mill, B. Du Pont, Brook st., Louisville. Built in 1849. First called Louisville Rolling Mill. Covington Rail Mill, James G. Kyle & Bro., Covington, Kenton county. Built in 1854; product, rails. Dismantled in 1878.

## TENNESSEE.

Memphis Rolling Mill, James Tranter, Cincinnati, Ohio. Mill at Memphis, Shelby county. Built in 1866; product, merchant bar, plow slabs, fish bars, and street rails. Dismantled in 1879.

## OHIO.

Alliance Rolling Mill, Alliance, Stark county. Built in 1867; product, rails. Dismantled in 1878. Ashtabula Rolling Mill, Ashtabula, Ashtabula county. Built in 1873-4; product, boiler plate, sheet iron, shingle bands, washers, and wrought spikes. Dismantled in 1879. Empire Rolling Mill, Gest st. and C., H. & D. R. R., Cincinnati. Built in 1876. Will probably be dismantled. Evans and Clifton Rolling Mill, Cincinnati. Built in 1864; dismantled in 1886.

Grasshopper Iron Works, The Arms, Bell & Co., Youngstown. Built in 1876; product, bar iron, spikes, rivets, and nuts. Burned in January, 1886.

Leetonia Nail and Bolt Company, Leetonia, Columbiana county: 26 nail machines and train for making nail plate; annual capacity, 2,600 net tons. H. F. Christy, Agent.

Marietta Rail Mill, Marietta, Washington county. Built in 1867; product, rails, fish-plates, and bar and hoop iron. Dismantled in 1886.

Newark Rolling Mill, Newark, Licking county. Built in 1868 to roll rails; changed to a bar mill in 1875; dismantled in 1879.

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

Valley Iron Company, Cleveland. Built in 1874-5; product, bar iron. Abandoned in 1880.

Warren Rolling Mill, Warren, Trumbull county. Built in 1870, burned in 1878, and rebuilt in 1879; product, muck bar, railroad links and pins, and bar iron.

#### INDIANA.

Capital City Iron Works, Indianapolis. Product, bar iron. Not in operation for many years.

Western Iron Company, Knightsville, Clay county. Built in 1868; product, muck bar. Dismantled in 1879.

#### ILLINOIS.

Chicago Plate and Bar Mill, J. M. Ayer, 72 Washington st., Chicago. Product, plate and bar iron.

East St. Louis Rail Mill, East St. Louis, St. Clair county. Built in 1865 to make rails. Destroyed by fire in 1879.

Northwestern Nail Works, Dunleith. Built in 1875-6; product, nails; removed to Omaha in 1879.

#### MICHIGAN.

Jackson Iron Manufacturing Company, Jackson, Jackson county. Built in 1872. Dismantled in 1879. Machinery removed to Springfield Iron Company's mill, Springfield, Ill.

Marquette Rolling Mill, Marquette and Pacific Rolling Mill Company, Marquette, Marquette county. Built in 1871; product, bar iron. Idle since 1875.

#### MISSOURI.

Tudor Iron Works, St. Louis. Built in 1870; product, railroad spikes.

#### KANSAS.

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

#### UTAH TERRITORY.

Ogden Iron Works, Ogden. Begun in 1875, and completed in 1882. Removed to South Pueblo, Colorado, in 1884.

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RECENTLY ABANDONED STEEL WORKS.

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- Adirondac Steel Works, Jersey City, New Jersey. Built in 1847. Dismantled in 1885. Product, crucible steel.
- American Cast Steel Company, Cleveland, Ohio. Built in 1878 to make steel by the Bechtold patent.
- Atlantic Steel Works, Richardson, Boynton & Co., 232 Water st., New York. Abandoned the manufacture of crucible steel in 1875.
- Calumet Tool Company, Chicago. Steel works built in 1879. Product, crucible steel.
- Chicago Sheffield Steel Works, 149 Fulton st., Chicago. Built in 1874-5. Product, crucible steel.
- Cleveland Cast Steel Works, H. W. Foote, 145 Superior st., Cleveland, Ohio. Built in 1877 to make crucible steel castings.
- Cleveland Steel Company, Cleveland. Built in 1880. Product, crucible steel.
- Crucible Cast Steel Casting Company Limited, Pittsburgh. Built in 1875 to make crucible steel castings.
- Crucible Steel Casting and Metal Company, Louisville, Ky. Built in 1879-80. Abandoned in 1882.
- Estate of G. F. Wilson, Providence, R. I. Open-hearth steel plant, consisting of one furnace.
- Glenwood Steel Works, Glenwood Station, B. & O. R. R., Pittsburgh. Built in 1879. Product, open-hearth steel.
- Goddard & Poulterer, Front and Laurel sts., Philadelphia. Started a crucible steel works in the Disston building in 1885, but abandoned it the same year.
- Joseph W. Howard Limited, corner Albany and Swett sts., Boston, Mass. First steel made in September, 1883; product, crucible steel castings.
- North River Steel Works, Thirteenth and Henderson sts., Jersey City, New Jersey. Built in 1875; product, crucible steel.
- Pittsburgh Steel Works, Ross st. and First avenue, Pittsburgh. Built in 1845. Product, crucible steel.
- Read & Thaw, North and Irwin avenues, Allegheny City, Pa. Built in 1878. Product, crucible steel castings.
- Solid Steel Casting Company, North Newark, Essex county, New Jersey. Built in 1884. Product, crucible steel castings.
- St. Albans Iron and Steel Works, St. Albans, Vermont. Built in 1873. Product, open-hearth steel.
- Washington Steel Works, Reading, Pa. Built in 1885. Product, open-hearth and crucible steel castings. Abandoned in 1885.
- Wheeling Steel Works, Martin's Ferry, Ohio. Built in 1873-4. Product, crucible steel.

## FORGES.

NOTE.—Under this title are embraced all works which make wrought iron from ore. All direct processes are included under this head.

### MAINE.

Thomes, (O. S.,) Cumberland Centre, Cumberland county. Forge at Webb's Mills. Built in 1883; 3 fires.  
Number of forges in Maine: one.

### VERMONT.

East Middlebury Iron Works, Williams & Nichols, East Middlebury, Addison county. Rebuilt in 1880; 4 fires and one hammer; product, charcoal blooms for steel; annual capacity, 1,300 net tons.  
Number of forges in Vermont: one.

### NEW YORK.

#### ALL LOCATED IN THE LAKE CHAMPLAIN DISTRICT.

Altona Bloom Iron Works, G. W. & F. Palmer & Co., Altona, Clinton county. Two forges: One at Altona, built in 1868; 6 fires and one hammer; brand, "Altona." One at Alder Bend, 4 miles from Altona, built in 1880; 6 fires. Water-power; product, charcoal blooms for boiler plate and sheet iron, made from Chateaugay ore; annual capacity of each forge, 2,400 net tons.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Four works: Plattsburgh Iron Works were built at Plattsburgh in 1879 as a rolling mill; converted into a forge in 1883; 4 fires and one hammer. Chateaugay Lake Iron Works were built at Chateaugay Lake, Franklin county, in 1875; 16 fires and 3 hammers. Clayburgh Iron Works were built at Clayburgh, Clinton county, in 1844; rebuilt and enlarged in 1883; 7 fires and one hammer. Russia Iron Works were built at Moffittsville, Clinton county, in 1844; enlarged in 1883; 7 fires and one hammer. All run by water-power; product, charcoal blooms for general purposes, made from Chateaugay ore; total annual capacity, 12,000 net tons. Andrew Williams, President; M. F. Parkhurst, Cashier; A. L. Inman, General Manager, all at Plattsburgh; H. M. Olmsted, Treasurer, 21 Cortlandt st., New York. *See Furnaces.*  
Crown Point Iron Company, Ironville, Essex county. Main office,

- Crown Point. Built in 1828, rebuilt in 1879; 8 fires and one hammer; steam-power; product, charcoal blooms for steel; annual capacity, 2,400 net tons. *See Anthracite Furnaces.*
- Horicon Iron Company, 24 Cliff st., New York. Works at Ticonderoga, Essex county. Built in 1865; 6 fires and 2 steam hammers; product, charcoal blooms for steel. Cyrus Butler, President and Treasurer.
- Irona Forge, J. F. Reynolds, Irona, Clinton county. Built in 1868; 5 fires and one hammer; product, "Chateaugay" blooms, made from Chateaugay ore, intended wholly for steel.
- Keene Forge, W. F. & S. H. Weston, Keene, Essex county. Built in 1880; 6 fires and one hammer; water-power; product, charcoal blooms and billets for boiler plate and steel, made from Keene ore; brand, the letter W in a circle. *See Wilmington Forge.*
- Lewis Iron Works, Stower & Esmond, Essex, Essex county. Works at Lewis, Essex county. Built in 1837, rebuilt in 1875; 5 fires and one hammer; steam and water power; product, charcoal blooms for plate and sheet iron, wire, and steel.
- New Russia Iron Works, H. A. Putnam, Elizabethtown, Essex county. Forge at New Russia, 4 miles south of Elizabethtown. Rebuilt in 1879-80; one hammer and 4 fires; steam and water power; product, charcoal blooms for wire and steel.
- Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; 4 fires and one hammer; water-power; product, charcoal blooms for best boiler plate; annual capacity, 2,000 net tons.
- Peru Steel and Iron Works, E. J. Callanan, Clintonville, Clinton county. Built in 1837; 16 fires and 4 hammers; water-power; product, charcoal blooms for steel; annual capacity, 5,000 net tons.
- Peterburgh Iron Works, Peter Tremblay, Clayburgh, Clinton county. Forge at Peterburgh. Four fires and one hammer; water-power; product, charcoal blooms for steel.
- Rockville Forges, Altona, Clinton county. Two forges, 3 miles apart. One built in 1874, burned and rebuilt in 1879; the other built in 1879; 7 fires and 2 hammers; product, charcoal blooms. Idle.
- Sable Iron Works, J. & J. Rogers Iron Company, Ausable Forks, Essex county. One forge at Ausable Forks, built in 1848; 4 fires. Two forges at Black Brook, Clinton county, built in 1832; 12 fires. One forge at Jay, Essex county, built in 1809; 6 fires. Total, 22 fires, with 5 hammers; water-power; product, charcoal blooms for best tool cast steel; total annual capacity, 8,000 net tons. *See Rolling Mills.*
- Star Iron Works, Bowen & Signor, Saranac, Clinton county. Three forges in Clinton county. Two at Saranac, built in 1844, and one at Redford, built in 1880; one of the forges at Saranac has 7 fires and 2 hammers, and the other has 6 fires and one hammer; both operated by water-power. The forge at Redford has 4 fires and one hammer; water-power. Product of the three forges, steel billets and refined charcoal blooms for Siemens-Martin steel purposes. *See Rolling Mills.*
- Stone Forge, Nichols & Hull, Plattsburgh, Clinton county. Built in

1835; 6 fires and one hammer; water-power; product, charcoal blooms for all purposes; annual capacity, 2,000 net tons.

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; 4 fires and one hammer; water-power; product, charcoal blooms for boiler plate and steel, made from Keene ore; brand, two W's in circles. *See Keene Forge.*

Wood, (William W.,) Wood's Falls, Clinton county. Built in 1863, and rebuilt in 1872; 10 fires, (3 of which are knobbling fires,) one run-out fire, one cupola for casting, and 2 hammers; water-power; product, charcoal blooms, made from ore and occasionally from scrap iron; annual capacity, 4,000 net tons. *See Rolling Mills.*

Number of forges in New York: 27.

## NEW JERSEY.

Rockaway Direct Process Iron and Steel Company, Rockaway, Morris county. One Wilson deoxidizer and one steam hammer; product, charcoal blooms for steel purposes, made from ore. *See Rolling Mills.*

Number of direct-process works in New Jersey: one.

## PENNSYLVANIA.

Carbon Iron Company of Pennsylvania, West Middlesex, Mercer county. Use the Eames graphite process. *See Rolling Mills.*

Number of direct-process works in Pennsylvania: one.

## NORTH CAROLINA.

Catawba Valley Iron Works, John W. Blackwelder, Catawba, Catawba county. Built in 1874; 7 forge fires, 4 run-out fires, and 2 hammers; steam and water power; product, bar iron, plow moulds, etc.

Hyatt's Forges, Martin Hyatt, Mount Airy, Surry county. Two forges on Bull run, Stokes county. Product, bar iron for local use.

Maiden Creek Forge, William Williams & Son, Maiden, Catawba county. Built about 1825; 2 fires and one hammer; water-power; fuel, charcoal; product, bar iron for local use, made from ore and scrap.

Owl Creek Forge, Mercer Fain, Murphy, Cherokee county. Built in 1852; 2 fires; water-power; product, bar iron for local use.

Roan Mountain Steel and Iron Company, Wilder's, Mitchell county. Built in 1875; 3 forge fires and one hammer; water-power; product, charcoal blooms, made from ore. W. D. Jenkins, Superintendent.

Rocky Point Forge, Dr. J. W. Patton, Murphy, Cherokee county. Rebuilt in 1870; 2 fires and one hammer; water-power; fuel, charcoal; product, charcoal blooms for boiler plate, made from ore.

Tom's Creek Forge, J. L. & D. W. Worth. Forge on Tom's creek, Surry county. Built in 1862; 2 fires and one hammer; product, bar iron. Owners, J. L. Worth, Mt. Airy, and D. W. Worth, Bliss P. O.

Number of forges in North Carolina: 8.



## TENNESSEE.

- Click's Forge, Green Click, Middle Creek, Sevier county. Forge on Middle creek, Greene county, 7 miles southeast of Greeneville.
- King's Works, James E. Northington, Shady, Johnson county. Built in 1838; 2 fires and one hammer; water-power; product, bar iron.
- Little Doe Forge, William A. Morley, High Heath, Johnson county. Forge on Little Doe creek, 13 miles west of Taylorsville; 2 forge fires and 2 hammers; water-power; product, bar iron, made from ore.
- McQueen's Forge, Isaac McQueen, Baker's Gap, Johnson county. Forge on Roane creek, 10 miles southeast of Taylorsville, built in 1877.
- Morrison's Forge, Nat. Morrison, Head of Laurel P. O., Johnson county. Forge on Laurel creek, 7 miles from Taylorsville. Built in 1879; 3 fires and one hammer; water-power; product, bar iron for local use.
- Mud Splatter Forge, G. D. Heaton, lessee, Howard's Iron Works P. O., Johnson county. Built in 1867; 2 fires and one hammer; water-power. Owned by M. M. Wagner's Sons.
- Rhea's Forge, Dr. Robert C. Rhea, Shoun's X Roads, Johnson county. Built in 1880.
- Roane Creek Forge, B. R. Brown, Shoun's X Roads, Johnson county. Built in 1859; 2 fires and one hammer; water-power; product, bar iron for local use, made from ore.
- Rocky Ford Forge, J. W. McQueen, Shoun's X Roads, Johnson county. Built in 1875; 2 forge fires, 2 run-out fires, and one hammer; water-power; product, bar iron, made from ore.
- Sand Hill Forge, Daniel Slimp, Baker's Gap, Johnson county. Forge on Roane creek, 8 miles southeast of Taylorsville. Built in 1852; 2 fires and 2 hammers; water-power; product, bar iron from ore.

Number of forges in Tennessee: 10.

In the mountainous districts of East Tennessee the forges are usually operated by farmers who only make bar iron from ore whenever it is needed in their immediate neighborhood. The forges are generally given the names of their proprietors. Each forge usually has two fires; daily production about 250 lbs. to the fire; much depends upon the water-power which drives the blast and hammer; in exceptional cases even 700 lbs. a day are made.

## MISSOURI.

- Alta Vesta Iron and Steel Company, Kimmswick, Jefferson county. Built in 1873; 12 Peckham converting furnaces and fires to make iron by Peckham's patent direct process; 3 steam hammers; product, charcoal blooms for Siemens-Martin steel; annual capacity, 4,000 net tons.

Number of forges in Missouri: one.

Total number of iron-ore forges and direct-process works in the United States: 50.

## BLOOMARIES.

NOTE.—Under this title are embraced all works which hammer blooms from pig or scrap iron. Many plate, sheet, and wire makers have charcoal forge fires in their mills making blooms exclusively for their own use, but such establishments are not included in this list.

### CONNECTICUT.

Canton Bloomary Company, Collinsville, Hartford county. Built in 1880; 3 forge fires; water-power; product, charcoal blooms for fine forgings, steel-making, and wire rods, made from scrap iron; annual capacity, 2,000 net tons. Brand, "C. B. C." Edward H. Sears, Vice-President and Manager; William A. Baker, Treasurer; Oliver F. Perry, Secretary.

Number of bloomaries in Connecticut: one.

### NEW JERSEY.

Bloomington Forge, Martin J. Ryerson, Bloomington, Passaic county. Built in 1800, and rebuilt in 1841; 3 fires and one hammer; water-power; product, charcoal blooms for boiler plate and wire, made from scrap iron.

King Brothers, Drakesville, Morris county. Built about 1865; 2 fires and one hammer; product, scrap blooms; daily capacity, 5 to 6 net tons.

Paterson Bloomary, Peter Oberg & Co., Paterson, Passaic county. Built in 1878; 4 fires and one hammer; product, cold blast charcoal blooms and charcoal iron for boiler plate and wire, made from scrap iron; annual capacity, double turn, 2,500 net tons.

Port Oram Forge, Port Oram Manufacturing Company, Port Oram, Morris county. Built in 1878; started in August, 1878; 8 forge fires, one run-out fire, and 2 hammers; product, charcoal blooms, from scrap and pig iron, used for all purposes; annual capacity, double turn, 4,500 net tons. Robert F. Oram, President; Edward S. Hance, Superintendent.

Powerville Forge, B. O'Day, lessee, 543 Washington st., New York City. Works at Powerville. Built in 1845; 3 forge fires and one hammer; water-power; product, charcoal blooms for wire, plate, etc., made from scrap iron; annual capacity, single turn, 900 net tons. *See Rolling Mills.*

- Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built about 1800; 3 forge fires and one hammer; water-power; product, charcoal blooms for wire, made from scrap iron; annual capacity, double turn, 1,000 net tons.
- Steam Forge, George E. Righter, lessee, Parsippany. Forge at Rockaway, Morris county. Built in 1878; 4 forge fires and one hammer; product, charcoal blooms for boiler plates, wire, and flange iron, made from scrap iron; annual capacity, 1,300 net tons. Owned by B. B. Oram. *See Windham Forge.*
- Warren Forge, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1875; one 4-tuyere run-out, 3 forge fires, and one steam hammer; product, charcoal blooms for sheet iron, made from pig iron; annual capacity, 1,000 net tons. *See Rolling Mills.*
- Windham Forge, George E. Righter, lessee, Parsippany, Morris county. Forge at Stockholm. Two fires and one hammer; water-power; product, charcoal blooms for plate iron, wire, or steel, made from scrap; annual capacity, 800 net tons. *See Steam Forge.*
- Number of bloomaries in New Jersey: 9.

## PENNSYLVANIA.

- Bellefonte Iron Works, Valentine Ore Land Association, Bellefonte, Centre county. Built in 1810; 12 forge fires, one 6-tuyere run-out, and one 4-ton hammer; product, charcoal blooms for boiler plate, wire, etc., made from pig iron; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Carlisle Iron Works, C. W. Ahl & Son, Carlisle. Works at Boiling Springs, Cumberland county. Built in 1760, and rebuilt in 1860; 5 forge fires and one hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 2,200 net tons. Brand, "Carlisle." *See Charcoal Furnaces.*
- Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Built before 1749; 5 forge fires, one heating furnace, one refinery, and one hammer; water-power; product, charcoal and coke blooms for boiler plate and sheet iron, made from pig iron; annual capacity, 1,000 net tons.
- Cove Forge, Wm. McIlvain & Sons, Duncannon, Perry county. Office, Reading, Pa. First put in operation in 1864; 5 fires, one refinery, and one 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. Francis Heilig, Superintendent, Duncannon. *See Eastern Pennsylvania Rolling Mills.*
- Eagle Forge, Curtins & Co., Roland, Centre county. Built in 1809; 8 fires and one hammer; water-power; product, blooms for general purposes, made from charcoal pig iron; specialties, blooms for boiler plate and rivet and screw rods; annual capacity, 1,500 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

- Ellendale Forge, J. H. Lick & Co., Ellendale Forge, Dauphin county. Built in 1838, and rebuilt in 1872; 5 charcoal forge fires, one coke run-out, and one hammer; steam and water power; original manufacturers of the "Sheridan" blooms, made exclusively from Sheridan pig iron, used for plate and sheet iron; annual capacity, 1,200 net tons.
- Ellwood Forge, Dr. G. N. Eckert's heirs, Ellwood, Schuylkill county. Built in 1863; 4 fires and one run-out; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,250 net tons. Not in operation since 1879.
- French Creek Forge, Esther Kaufman, St. Peter's P. O., Chester county. Built in 1872; 4 fires and one hammer; water-power; product, charcoal blooms, made from scrap iron. Thomas Wanner, Attorney.
- Gibraltar Iron Works, S. Seyfert & Co., Reading, Berks county. Built in 1846; one coke run-out, 4 charcoal forge fires, and 2 hammers; water-power; product, charcoal blooms for flue iron and boiler plate; annual capacity, 500 net tons. *See Eastern Pennsylvania Rolling Mills.*
- Howard Iron Works, Bernard Lauth, Howard, Centre county. Built in 1879; 10 fires, one 6-tuyere run-out, and one steam hammer; steam and water power; product, charcoal blooms; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Juniata Forge, J. A. & E. Eichelberger, Petersburg, Huntingdon county. Five forge fires, one run-out fire, and one hammer; water-power; product, charcoal blooms, made from pig iron; annual capacity, 800 net tons.
- Laurel Forge, South Mountain Mining and Iron Company, Pine Grove Furnace, Cumberland county. Built in 1830; 6 fires, one double run-out, and one hammer; water-power; product, charcoal blooms, made from Pine Grove pig iron; annual capacity, 2,000 net tons. Joseph Fuller, Superintendent. *See Charcoal Furnaces.*
- Lebanon Rolling Mills, Samuel E. Light, Lebanon. Forge built in 1885-6; 6 fires and one hammer; product, blooms for plate and sheet iron, made from scrap; weekly capacity, 90 net tons. *See Central Pennsylvania Rolling Mills.*
- Liberty Forge, Lloyd & Boyer, Lisburn, Cumberland county. Built in 1836; 3 forge fires, one run-out, and one hammer; water-power; product, charcoal and coke blooms, made from pig iron.
- Lickdale Forge, Lickdale Iron Company, Lebanon. Forge at Lickdale P. O., Lebanon county. Built about 1790; torn down in 1884, and a new forge erected; 6 forge fires, one run-out, and one hammer; steam and water power; product, charcoal blooms for wire, boiler plate, and sheet iron, made from scrap and pig iron; annual capacity, 3,600 net tons. *See Steel Works.*
- Lucknow Forge, Seidel Brothers, lessees, Harrisburg. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 8 forge fires and one steam hammer; product, blooms for boiler plate, sheet iron,

- wire, etc., made from pig and scrap iron; annual capacity, 3,500 net tons. *See Perry Forge.*
- Martie Forge, Davies & Potts, Colemanville, Lancaster county. Built in 1755; 4 fires, one run-out, and 2 hammers; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 800 net tons. R. S. Potts, Agent.
- Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 fires and one hammer; water-power; product, charcoal blooms for boiler plate and best wire, made from pig iron. Wire used for flat and round head wood-screws and for best grade of carriage bolts. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Mont Alto Iron Works, Mont Alto Iron Company, Mont Alto, Franklin county. Telegraph connection with Western Union office at Chambersburg. Built in 1866; 8 Wiestling's patent improved Lancashire hearths and a double run-out fire; one Nasmyth steam hammer and one self-acting steam helve hammer; product, charcoal blooms for all purposes requiring best quality; annual capacity, 4,000 net tons. Brand, "Mont Alto." General office at the works, and all sales made by the Superintendent, George B. Wiestling. *See Charcoal Furnaces.*
- New Market Forge, Theodore B. Klein, Syner, Lebanon county. Rebuilt in 1860; 5 fires, one run-out, and one 5-ton hammer; steam and water power; product, charcoal blooms for boiler plate and coal shute iron, made from scrap iron; annual capacity, 1,300 net tons. Not in operation in 1886.
- Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862; 7 forge fires, one run-out fire, and one hammer; water and steam power; product, charcoal and anthracite blooms for boiler plate, sheet iron, wire, etc., made from pig iron; annual capacity, 2,800 net tons. *See Lucknow Forge.*
- Schuylkill Steam Forge, C. C. Morret, Douglassville, Berks county. Completed in 1878; 8 fires, one double run-out, and one hammer; product, charcoal blooms for boiler plate and sheet iron, made from charcoal pig iron and scrap iron.
- Spring City Forge, Francis & Co., Spring City, Chester county. Built in 1884; 6 forge fires and one hammer; product, blooms, used for plate and sheet iron, made from scrap iron; daily capacity, double turn, 14 net tons.
- Springton Forge, M. K. Genner, Wallace, Chester county. Built in 1790, and rebuilt in 1881; 4 forge fires, one run-out, and one hammer; water-power; product, charcoal blooms. Alfred G. Genner, Manager.
- Tyrone Forges, Tyrone Iron Company, Tyrone, Blair county. Established in 1809, rebuilt in 1870; 8 fires, one double run-out, and one hammer; blast operated by water-power and hammer by steam-power. *See Rolling Mills.*
- Number of bloomeries in Pennsylvania: 24.

## MARYLAND.

Northeast Forge, McCullough Iron Company, Northeast, Cecil county. Built in 1847 and 1875; 18 fires and 2 hammers; product, charcoal blooms for sheet iron exclusively, made from scrap and pig iron; annual capacity, 6,000 net tons. *See Rolling Mills in Delaware and Maryland.*

Principio Forge, George P. Whitaker Company, Principio Furnace P. O., Cecil county. Telegraph address, Perryville. Built in 1883-4; 12 fires, one heating furnace, and one hammer; coke run-out attached; steam-power used throughout; product, charcoal blooms for sheet iron, used principally by the Whitaker Iron Company, of Wheeling, W. Va. G. P. Whitaker, President. *See Furnaces.*

Number of bloomaries in Maryland: 2.

## VIRGINIA.

Eagle Furnace Forge, Crockett & Co., Crockett Depot, Wythe county. Built in July, 1882; 2 fires; product, bar iron for local use, made from pig iron. *See Charcoal Furnaces.*

Graham's Forge, Graham & Robinson, Graham's Forge P. O., Wythe county. Built in 1827; 2 fires and one hammer; water-power; product, bar and other iron, made from charcoal pig iron. *See Charcoal Furnaces.*

Henry R. Haines, Alexandria. Built a forge in 1886 to make blooms from pig and scrap iron.

Milnes Iron Works, Shenandoah Iron Company, Milnes, Page county. Built in 1871; 7 forge fires, one 6-tuyere run-out, and one hammer; product, charcoal blooms for boiler plate and flange iron, made from pig iron; annual capacity, 1,800 net tons. Brand, "Wm. M., Jr." Forge not now at work. William Milnes, Jr., President. *See Coke Furnaces.*

Pine Forge, J. C. Frederick & Co., Mount Jackson, Shenandoah county. Rebuilt in 1874; one charcoal forge fire, 2 hammers, one refinery, and 3 knobbling fires; water-power; product, charcoal blooms and bar iron.

Number of bloomaries in Virginia: 5.

## OHIO.

Paulding Forge, Paulding Iron Company Limited, lessee, Cecil, Paulding county. Built in 1867; 8 fires and one steam hammer; product, charcoal blooms for general purposes, made from pig iron; annual capacity, single turn, 1,500 net tons. *See Northwestern Charcoal Furnaces.*

Number of bloomaries in Ohio: one.

Total number of pig-and-scrap bloomaries in the United States: 42.

## RECENTLY ABANDONED FORGES AND BLOOMARIES.

### VERMONT.

Fairhaven Iron Works, Fairhaven, Rutland county. Built in 1796.  
Pittsfield Iron and Steel Company, Pittsfield, Rutland county. Works at Chittenden, Rutland county. Built in 1881-2.

### MASSACHUSETTS.

Mount Hope Iron Works, East Bridgewater, Plymouth county. Office at Somerset, Bristol county. Built in 1840.

### NEW YORK.

John Merchant's Forge, Schuyler Falls, Clinton county. Built in 1844.  
Kingdom Forge, Essex and Lake Champlain Ore and Iron Company, Elizabethtown, Essex county. Built in 1825.  
Lake Champlain Forge, State Prison yard, Dannemora, Clinton county. Built in 1865. Abandoned in 1877.  
Merriam & Rouse, Westport, Essex county.  
Paradox Iron Works, Schroon River, Essex county. Built in 1864.  
Plattsburgh Iron Works, Plattsburgh, Clinton county. Built in 1878.  
Schroon River Iron Works, Schroon River, Essex county. Built in 1857; burned in 1881.  
Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835. Abandoned in 1883.

### NEW JERSEY.

Split Rock Forge, Morris county. Built in 1797.

### PENNSYLVANIA.

Allegheny Forge, Mrs. Elizabeth Lytle, Martinsburg, Blair county. Built in 1831. Abandoned in 1879.  
Barree Forge, Barree Forge P. O., Huntingdon county. Built in 1785.  
Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. One Siemens rotator, abandoned and wrecked in 1884.  
Castle Fin Forge, James K. Brown, Castle Fin, York county. Built in 1835; abandoned in 1874.  
Cold Spring Forge, Tyrone, Blair county.  
Colemanville Works, Colemanville, Lancaster county. Built in 1828.  
Coleraine Forge, Shorb, Stewart & Co., Coleraine, Huntingdon county.  
Cove Forge, estate of John Royer, Williamsburg, Blair county. Works on Frankstown branch, 2 miles from Williamsburg. Built in 1811.  
Franklin Forge, James Gardner, Hollidaysburg, Blair county.



- Juniata Iron Works, Samuel Hatfield, Alexandria, Huntingdon county.  
Built in 1837.
- Logan Works, Lewistown, Mifflin county.
- Mainville Forge, Charles Reichart, Mainville, Columbia county. Built in 1824.
- Maria Forge, G. W. Smith, Sarah, Blair county.
- Mary Ann Forge, Downingtown, Chester county. Built in 1785.
- Monroe Forge, Lebanon county.
- Mount Airy Forge, Shartlesville, Berks county. Built about 1840.
- Mount Etna Forge, Samuel Isett, Yellow Springs, Blair county. Built in 1808.
- Moyer's Forge, Jacksonwald, Berks county. Built in 1836.
- North Kiln Forge, M. B. Seyfert & Co., Shartlesville, Berks county. Built in 1830.
- Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county.
- Sadsbury Forge, Charles Goodman & Brother, Atglen, Chester county. Built about 1820.
- Siemens-Anderson Steel Company, William Rea, trustee for creditors, Pittsburgh. Three Siemens rotators.
- Washington Forge, Lamar, Clinton county.

## VIRGINIA.

- Bowling Green Forge, Bales' Mills, Lee county. Built in 1829.
- Columbia Forge, Columbia Furnace P. O., Shenandoah county.
- Crockett, Sanders & Co., Wytheville, Wythe county. Built in 1863.
- Gray Eagle Forge, Red Bluff, Wythe county. Built in 1862.
- Liberty Forge, Liberty Furnace P. O., Shenandoah county. Built in 1821.
- Mockasine Forge, Estillville, Scott county. Built in 1851.
- Mount Vernon Iron Works, Abbott Iron Company, Baltimore, Md.  
Works near Weyer's Cave, Rockingham county. Built in 1848.
- Penington's Forge, Jonesville, Lee county. Built in 1873.
- Porter's Forge, Speedwell, Wythe county. Built in 1865.
- Reed Island Forge, Allisonia, Pulaski county. Built in 1875.
- Wilkinson's Forge, Lobdell Car-wheel Company, Carroll county.

## NORTH CAROLINA.

- Brevard's Forge, on Dutchman's creek, Lincoln county.
- Cranberry Forge, Mitchell county.
- Henson's Forge, H. Warlick, Murphy, Cherokee county. Built in 1840.
- Madison Forge, Jonas W. Derr, Lincolnton, Lincoln county. Built about 1830.
- Rehoboth Forge, John Leonard & Co., Iron Station, Lincoln county.
- Tomatola Forge, Tomatola Iron Company, Tomatola, Cherokee county.  
Office at Cincinnati. Built in 1869.
- Tuscarora Forge, North Carolina Centre Iron and Manufacturing Company, Guilford county. Office at Philadelphia. Built in 1869.

## GEORGIA.

Allatoona Creek Forge, Lewis T. Erwin, Allatoona, Bartow county.  
Built in 1878-9.

## WEST VIRGINIA.

Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county.  
Built in 1874.

## KENTUCKY.

Red River Forge, Fitchburg, Estill county.

## TENNESSEE.

Camp Creek Forge, Jones & Kennedy, Camp Creek, Greene county.  
Built about 1815.

Chief Creek Forge, Napier Iron Company, Napier Furnace, Lawrence county. Built in 1860.

Dugger's Forge, Stump Knob, Johnson county. Forge near Watauga river. Built in 1820.

Hampton Iron Works, on Doe river, in the Crab Orchard, 18 miles southeast of Elizabethton, Carter county.

Jackson's Forge, in Unicoi county, on Clarke's creek, 15 miles south of Jonesboro.

Laurel Iron Works, T. G. McConnell, Abingdon, Virginia. Works at Laurel Bloomary, Johnson county. Built in 1824.

Nave's Forge, John Nave, Watauga, Carter county. Forge on Stony creek, 6 miles north of Elizabethton.

Northington's Forge, James Northington, Shady, Johnson county.

Potter's Forge, O. J. Potter, Shoun's X Roads, Johnson county. Forge on Roane creek, 4 miles southeast of Taylorsville. Built in 1867-8.

Shupe's Forge, Thomson Shupe, Shady, Johnson county. Built in 1872.

Smith's Forge, John Smith, Watauga, Carter county. Forge on Stony creek, 10 miles north of Elizabethton.

Speedwell Forge, Knoxville Car-wheel Company, Knoxville. Forge at Stony Creek, Carter county.

Speedwell Forge, Harbison & Longmire, Speedwell, Claiborne county.  
Built in 1873-4.

Valley Forge, H. C. Smith, Elizabethton, Carter county. Forge on Doe river, 3 miles southeast of the village. Built in 1820.

Wagner's Forges, M. M. Wagner's Sons, Taylorsville, Johnson county. Two forges on Little Doe creek; one 7 miles and the other 9½ miles west of Taylorsville.

Walker's Forge, George J. Walker, Pandora, Johnson county. Forge on Little Doe creek, 8 miles west of Mountain City.

## MISSOURI.

Germania Iron Works, Anthony Zeitinger, South St. Louis, St. Louis county. Built in 1871.

Maramec Iron Company, Maramec Iron Works, Phelps county. Built in 1828.

## PLATE AND SHEET MILLS.

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NOTE.—Mills making only nail plate, tack plate, or shovel plate are not included in this list. Mills put down as making *iron* plates or sheets, it will be understood, are rapidly changing to use *steel*. When the main office is not at the works its location is stated in parenthesis. For a complete description of the works enumerated below see the list of rolling mills.

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### NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. Iron and steel plates.

### MASSACHUSETTS—3.

Bay State Steel Company, 191 High st., Boston. Steel plates.

Norway Steel and Iron Company, 23 Mason Building, Boston. Steel plates; also, iron tack and nail plate.

Tremont Nail Company, West Wareham, Plymouth county. Iron plates.

### NEW YORK—3.

Elmira Iron and Steel Rolling Mill Company, Elmira. Iron plates.

Troy Steel and Iron Company, Troy. Steel sheets.

Union Iron Works, Buffalo. Iron plates. Idle.

### NEW JERSEY—1.

American Sheet Iron Company, Phillipsburg. Iron sheets.

### PENNSYLVANIA—EASTERN DISTRICT—29.

Bethlehem Iron Company, Bethlehem. Heavy iron and steel plates.

Brandywine Rolling Mills, Worth Brothers, Coatesville. Iron plates.

Catasauqua Manufacturing Company, Catasauqua. Iron and steel plates.

Chester Rolling Mills, Thurlow. Iron and steel plates.

Coatesville Iron Works, Coatesville. Iron and steel plates.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, (223 North Second st., Philadelphia,) Conshohocken. Iron plates and sheets.

Easton Sheet Iron Works, Reilly & Oliver, Easton. Iron sheets.

Gibraltar Iron Works, S. Seyfert & Co., Reading. Iron plates.

Glasgow Iron Company, Pottstown. Iron and steel plates.

Gray's Ferry Iron Works, Edward S. Buckley, 209 South Third st., Philadelphia. Iron plates.

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Steel plates.

Keystone Iron Works Limited, Reading. Iron plates.

- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Tacony, Philadelphia. Steel sheets.
- Laurel Iron Works, operated by Coatesville Iron Works, Coatesville. Iron plates.
- Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Iron and steel plates.
- McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Iron plates.
- Parkesburg Iron Company, Parkesburg. Iron plates.
- Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Iron sheets.
- Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Iron plates.
- Pine Iron Works, Bailey & Shoemaker, Pine Iron Works P. O., Berks county. Iron and steel plates.
- Plymouth Rolling Mill Company, Conshohocken. Iron and steel plates and sheets.
- Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown. Iron plates.
- Pottstown Iron Company, Pottstown. Iron and steel plates.
- Reading Iron Works, (259 South Fourth st., Philadelphia,) Reading. Iron plates and sheets.
- Schuylkill Iron Works, Alan Wood Company, (519 Arch st., Philadelphia,) Conshohocken. Iron plates and sheets.
- Seyfert Rolling Mills, Samuel R. Seyfert, Reading. Iron plates.
- Stony Creek Rolling Mill, Norristown. Iron plates. Idle.
- Thorndale Iron Works Company, Thorndale, Chester county. Iron plates.
- Valley Iron Works, C. E. Pennock & Co., Coatesville. Iron plates.

PENNSYLVANIA—CENTRAL DISTRICT—6.

- Central Iron Works, Harrisburg. Iron and steel plates.
- Lebanon Rolling Mills, Samuel E. Light, Lebanon. Iron plates and sheets.
- North Branch Steel Company, (330 Walnut st., Philadelphia,) Danville. Steel plates and sheets.
- Paxton Rolling Mills, McCormick estate, Harrisburg. Iron and steel plates.
- Pennsylvania Steel Company, (208 South Fourth st., Philadelphia,) Steelton, Dauphin county. Steel plates.
- York Rolling Mill, Schall, Steacy & Denney, York. Iron plates.

PENNSYLVANIA—WESTERN DISTRICT—34.

- Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers & Phillips, Pittsburgh. Iron and steel plates.
- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Iron and steel plates and sheets.

- Apollo Iron and Steel Company, (Pittsburgh,) Apollo, Armstrong county. Iron and steel sheets.
- Apollo Sheet Iron Works, P. H. Laufman & Co. Limited, (Pittsburgh,) Apollo, Armstrong county. Iron and steel sheets.
- Beaver Falls Iron Company, Beaver Falls, Beaver county. Iron sheets.
- Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Steel plates and sheets.
- Byers (A. M.) & Co., Pittsburgh. Iron plates and sheets.
- Canonsburg Iron and Steel Company, Canonsburg, Washington county. Iron and steel sheets.
- Carnegie, Phipps & Co. Limited, Pittsburgh. Iron and steel plates.
- Chartiers Iron and Steel Company Limited, Pittsburgh. Iron and steel sheets.
- Clinton, Millvale, and Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. Iron and steel plates and sheets.
- Hussey, Howe & Co. Limited, Pittsburgh. Steel plates and sheets.
- Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Iron and steel plates and sheets.
- Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Iron plates and sheets.
- Kimberly (P. L.) & Co., Sharon, Mercer county. Iron plates and sheets.
- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Iron and steel sheets.
- Linden Steel Company Limited, Pittsburgh. Steel plates and sheets.
- McKeesport Iron Works, W. D. Wood & Co. Limited, Pittsburgh. Iron sheets.
- National Tube Works Company, McKeesport, Allegheny county. Iron boiler plates.
- Old Fort Iron Mills, Brownsville, Fayette county. Iron sheets. Idle.
- Pennsylvania Iron Works, Everson, Hammond & Co. Limited, Pittsburgh. Iron and steel sheets.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., Pittsburgh. Steel plates and sheets.
- Republic Iron Works Limited, Pittsburgh. Iron plates and sheets.
- Scottdale Iron Works, William H. Everson & Co., Scottdale, Westmoreland county. Iron sheets.
- Sharon Iron Company, Sharon, Mercer county. Iron plates and sheets.
- Singer, Nimick & Co. Limited, Pittsburgh. Steel plates.
- Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Iron plates and sheets.
- Soho Iron Mills, Moorhead & Co., Pittsburgh. Iron and steel plates and sheets.
- Spang Steel and Iron Company Limited, Pittsburgh. Steel plates.
- Union Iron Mills, Carnegie Bros. & Co. Limited, Pittsburgh. Iron and steel plates.
- United States Iron and Tin Plate Company Limited, Demmler P. O., Allegheny county. Iron and steel plates and sheets.

- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. Iron plates and sheets.  
 Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Iron boiler plate.  
 West Penn Steel Works, Jennings, Beale & Co., (Pittsburgh,) Leechburg, Armstrong county. Steel sheets.

DELAWARE—7.

- Christiana Iron Company, Wilmington. Steel boiler plate. Idle.  
 Delaware Iron Company, New Castle. Iron plates. Idle.  
 Delaware Iron Works, Alan Wood Company, (519 Arch st., Philadelphia, Pa.,) Wooddale, New Castle county. Iron sheets.  
 Marshallton Iron Works, John R. Bringhurst, Marshallton. Iron sheets.  
 Minquas Iron Works, McCullough Iron Company, (1600 Washington avenue, Philadelphia, Pa.,) Wilmington. Iron sheets.  
 Newport Rolling Mills, Marshall Iron Company, Newport. Iron and steel sheets.  
 Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Iron and steel boiler plate.

MARYLAND—4.

- Abbott Iron Company, Baltimore. Iron plates. Idle.  
 Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland. Iron plates.  
 Locust Point Iron and Steel Works, Coates & Co., Baltimore. Iron and steel plates.  
 McCullough Iron Company, (1600 Washington avenue, Philadelphia, Pa.,) Northeast, Elkton, and Rowlandville, Cecil county. Iron sheets.

DISTRICT OF COLUMBIA—1.

- Equipment Iron Rolling Mill, Navy Yard, Washington. Iron plates.

ALABAMA—1.

- Birmingham Rolling Mill Company, Birmingham. Iron plates and sheets.

WEST VIRGINIA—1.

- Crescent Iron Works, Whitaker Iron Company, Wheeling. Iron sheets.

KENTUCKY—5.

- Anchor Iron and Steel Works, L. M. Dayton, (94 West Second st., Cincinnati, Ohio,) Newport, Campbell county. Iron plates and sheets.  
 Ewald Iron Company, (801 North Second st., St. Louis, Mo.,) Tennessee Rolling Works, Lyons county, and Louisville. Iron plates and sheets.  
 Licking Iron Works, Licking Rolling Mill Company, Covington. Iron plates and sheets.  
 Mitchell, Tranter & Co., (Second and Elm sts., Cincinnati, Ohio,) Covington. Iron and steel plates and sheets.  
 Swift's Iron and Steel Works, (26 West Third st., Cincinnati, Ohio,) Newport. Iron and steel plates and sheets.

## OHIO—22.

- Aetna Iron and Steel Company, Bridgeport, Belmont county. Iron and steel plates and sheets.
- Britton Iron and Steel Company, Cleveland. Iron and steel plates and sheets.
- Burgess Steel and Iron Works, Portsmouth. Iron and steel boiler plates.
- Cleveland Rolling Mill Company, Cleveland. Iron and steel plates and sheets.
- Falcon Iron and Nail Company, Niles. Iron sheets.
- George Summer's Sons, Niles. Iron plates and sheets.
- Globe Rolling Mill Company, 163 and 165 West Pearl st., Cincinnati. Iron plates and sheets.
- Haselton Iron Works, Andrews Brothers & Co., Youngstown. Iron and steel sheets.
- Irondale Rolling Mill, Wallace, Banfield & Co. Limited, Irondale, Jefferson county. Iron and steel sheets.
- Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton. Iron plates and sheets.
- Mahoning Iron Works, Brown, Bonnell & Co., Youngstown. Iron sheets and universal plates.
- Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown. Iron sheets.
- Maumee Rolling Mill Company, Toledo. Iron plates and sheets.
- New Philadelphia Iron and Steel Company, New Philadelphia, Tuscarawas county. Iron plates and sheets.
- Norway Rolling Mill Company, 227 Main st., Cincinnati. Iron and steel plates.
- Otis Iron and Steel Company, Cleveland. Steel plates.
- Portsmouth Iron and Steel Works, Portsmouth. Iron and steel plates and sheets. Idle.
- Riverside Iron and Steel Company, 26 West Third st., Cincinnati. Iron and steel plates and sheets.
- Russia Sheet-Iron Mills, Falcon Iron and Nail Company, lessees, Niles. Iron sheets.
- Standard Iron Company, Bridgeport, Belmont county. Iron and steel sheets.
- Summers Iron Works, Summers Bros. & Co., Struthers, Mahoning county. Iron sheets.
- Wellsville Plate and Sheet Iron Company, (111 Water st., Pittsburgh, Pa.,) Wellsville, Columbiana county. Iron plates and sheets.

## ILLINOIS—1.

- Springfield Iron Company, Springfield. Steel plates and sheets.

## MISSOURI—2.

- Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Iron sheets.



Laclede Rolling Mills, Chouteau, Harrison & Vallé Iron Company, 941 North Second st., St. Louis. Iron and steel plates and sheets.

MICHIGAN—1.

Eureka Iron and Steel Works, Detroit. Iron plates.

UNITED STATES.

Total number of plate and sheet iron and steel mills in the United States: 122.

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## NAIL MILLS.

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NOTE.—This list embraces all rolling mills in the United States which have nail machines. For a complete description of the works enumerated below see the list of rolling mills.

MASSACHUSETTS—11.

East Bridgewater Iron Company, Rogers & Sheldon, East Bridgewater. Office, 81 Water st., Boston. 26 nail machines.

Fall River Iron Works, Fall River Iron Works Company, Fall River. 105 nail machines.

Gosnold Mills, New Bedford. 10 nail machines.

Mount Hope Iron Works, Somerset. 65 nail machines.

Parker Mills, Bridgewater Iron Company, Wareham. Office at Bridgewater. 75 nail machines.

Reed Brothers' Rolling Mill and Tack and Nail Works, D. L. & F. S. Reed, Brockton. 54 cut nail and tack machines.

Robinson Iron Company, Plymouth. 18 nail machines.

Somerset Iron Works, Old Colony Iron Company, Somerset. Office at Taunton. 70 nail machines.

Tremont Nail Company, West Wareham. 75 nail machines.

Wareham Nail Company, South Wareham. 33 nail machines.

Weymouth Iron Company, 134 Milk st., Boston. Works at East Weymouth. 75 nail machines.

NEW YORK—1.

Troy Steel and Iron Company, Troy. 33 nail machines.

NEW JERSEY—3.

Boonton Iron Works, Boonton. 134 nail machines. (Only part of these works are in operation; Patterson, Anthony & Grubb, lessees.)

Cumberland Nail and Iron Company, Bridgeton. 84 nail machines.

Oxford Iron and Nail Company, Oxford. 103 nail machines.

## PENNSYLVANIA—EASTERN DISTRICT—6.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. 113 nail machines.  
Ellis (The) and Lessig Steel and Iron Company Limited, Pottstown. 100 nail machines.  
Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. 41 nail machines.  
Plymouth Rolling Mill Company, Conshohocken. 7 nail machines.  
Pottstown Iron Company, Pottstown. 95 nail machines.  
Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. 28 nail machines.

## PENNSYLVANIA—CENTRAL DISTRICT—16 COMPLETED AND 1 BUILDING.

Bellefonte Iron and Nail Company Limited, Bellefonte. 53 nail machines.  
Chesapeake Nail Works, Charles L. Bailey & Co., Harrisburg. 103 nail machines.  
Crescent Nail Works, Standard Nail and Iron Company, Williamsport. Works at Standard. 18 nail machines.  
Danville Nail Works, Danville Nail and Manufacturing Company, Danville. 80 nail machines.  
Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 64 nail machines.  
Harrisburg Nail Works, McCormick estate, Harrisburg. Works at Fairview, Cumberland county. 80 nail machines.  
Holidaysburg Iron and Nail Company, Hollidaysburg. 24 machines.  
Johnson (Reuben) & Co., Northumberland. 100 nail machines.  
Juniata Rolling Mill, McLanahan, Smith & Co. Limited, Hollidaysburg. 30 nail machines.  
Lewisburg Nail Works, Lewisburg. 35 nail machines.  
Milton Nail Works, C. A. Godcharles & Co., Milton. 100 nail machines.  
Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 53 nail machines.  
Portage Iron Company Limited, Duncansville. 37 nail machines.  
Sheibley (W. S.) & Co., Lock Haven. Building; 25 nail machines.  
Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury. 41 nail machines.  
Towanda Nail Works, R. A. Bostley & Co., Towanda. 31 nail machines.  
Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. 61 nail machines.

## PENNSYLVANIA—WESTERN DISTRICT—9.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. 63 nail machines.  
Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. 96 nail machines.

Atlantic Iron and Nail Works, P. L. Kimberly & Co., Sharon. 40 nail machines.  
Clinton Rolling Mill, Graff, Bennett & Co., Pittsburgh. 41 nail machines. Not operating nail department.  
Etna Iron Works Limited, New Castle, Lawrence county. 55 nail machines.  
Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. 92 nail machines.  
Sable Iron and Nail Works, Zug & Co. Limited, Pittsburgh. 60 nail machines.  
Sharon Iron Company, Sharon. 64 nail machines.  
Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. 50 nail machines.

## VIRGINIA—2.

Old Dominion Iron and Nail Works, Richmond. Works on Belle Isle. 100 nail machines.  
Virginia Nail and Iron Works Company, Lynchburg. 45 nail machines.

## ALABAMA—2.

Brierfield Coal and Iron Company, Brierfield. 72 nail machines.  
Central Iron Works, Helena, Shelby county. 10 nail machines.

## WEST VIRGINIA—5.

Belmont Nail Company, Wheeling. 151 nail machines.  
Benwood Iron Works, Benwood, Marshall county. Office at Wheeling. 173 nail machines.  
La Belle Iron Works, Wheeling. 142 nail machines.  
Riverside Iron Works, Wheeling. 224 nail machines.  
Top Mill, Wheeling Iron and Nail Company, Wheeling. 130 nail machines.

## KENTUCKY—1.

Norton Iron Works, Ashland. 126 nail machines.

## TENNESSEE—2.

Knoxville Iron Company, Knoxville. 41 nail machines.  
South Tredegar Iron Company, Chattanooga. 74 nail machines.

## OHIO—13.

Belfont Iron Works Company, Ironton. 126 nail machines.  
Bellaire Nail Works, Bellaire. 125 nail machines.  
Co-operative Nail Works Company, Steubenville. 18 nail machines.  
Falcon Iron and Nail Company, Niles. 44 nail machines.  
Jefferson Iron Works, Steubenville. 136 nail machines.  
Junction Iron Company, Mingo Junction, Jefferson county. Office at Wheeling, W. Va. 126 nail machines.  
Kelly Nail and Iron Company, Ironton. 100 nail machines.  
Laughlin Nail Company, Martin's Ferry, Belmont county. Office at Wheeling, W. Va. 192 nail machines.

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. 50 nail machines.

Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown. 55 nail machines.

Spaulding Iron Company, Brilliant, Jefferson county. 76 nail machines.

Standard Nail Works, Standard Nail and Iron Company, Middleport, Meigs county. 102 nail machines.

Wellston Steel and Nail Mill Company, Wellston, Jackson county. 130 nail machines.

INDIANA—3 COMPLETED AND ONE BUILDING.

Chicago Steel Manufacturing Company, First National Bank Building, Chicago. Building works at Hammond, Lake county, to contain 150 nail machines.

Cobb's Iron and Nail Company, Aurora. 50 nail machines.

Greencastle Iron and Nail Company, Greencastle. 45 nail machines.

Terre Haute Iron and Nail Works, Terre Haute. 144 nail machines.

ILLINOIS—5.

Belleville Nail Company, Belleville. 80 nail machines.

Belleville Steel and Iron Nail Works, Belleville. 60 nail machines.

Calumet Iron and Steel Company, Cummings. Office at Chicago. 132 nail machines.

Centralia Iron and Nail Works, Centralia. 52 nail machines.

Western Nail Company, Belleville. 154 nail machines.

WISCONSIN—1.

North Chicago Rolling Mill Company, Bay View. Offices at Chicago and Milwaukee. 100 nail machines.

NEBRASKA—1.

Union Steel Nail Company, Omaha. 32 nail machines.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo. 27 nail machines.

CALIFORNIA—1.

Pacific Iron and Nail Company, Oakland, Alameda county. Office at San Francisco. 96 nail machines.

UNITED STATES.

Total number of rolling mills containing nail machines: 83 completed, and 2 building. Number of nail machines: 6,355 in use, and 175 being placed in new mills.

In addition to the works enumerated above, all of which roll their own nail plate or intend soon to do so, there are a few small works in the country making nails from purchased plate, as follows:

Bush (Lewis), South Chicago, Illinois. Started a small nail works in 1885.

Excelsior Tack Works, P. Richards & Son, Nicetown, Philadelphia, Pa.

Built in 1876 to make tacks; began to make nails in 1886; have 14 machines; product, 3-penny fine and a variety of small nails. Graham, (T. D.,) 2,770 Broadway, Cleveland, Ohio. Began in 1886 to make small fine nails, such as finishing, casing, and barrel nails.

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## BESSEMER STEEL WORKS.

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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. The names of the mills which roll steel rails, as well as other products, are printed in SMALL CAPS.

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### MASSACHUSETTS—1.

WORCESTER STEEL WORKS, Worcester. Two 4-ton converters. Made first blow June 2, 1884.

### NEW YORK—1.

TROY STEEL AND IRON COMPANY, Troy. Two 10-ton converters. Made first blow February 16, 1865.

### NEW JERSEY—1 BUILDING.

Trenton Iron Company, Trenton. Building a 3-ton Bessemer converter.

### PENNSYLVANIA—11 COMPLETED AND 3 BUILDING.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Building a steel plant to consist of two 7-ton converters.

BETHLEHEM IRON COMPANY, Bethlehem. Four 7-ton converters and one 1-ton converter. Made first blow October 4, 1873.

CAMBRIA IRON COMPANY, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 9-ton converters. Made first blow July 10, 1871.

Columbia Iron and Steel Company, Uniontown, Fayette county. Building a steel plant to consist of two 5-ton converters.

Duquesne Steel Company, Pittsburgh. Building a steel plant to consist of two 6-ton converters.

E. and G. Brooke Iron Company, Birdsboro, Berks county. Two small converters. Made first blow September 21, 1885.

EDGAR THOMSON STEEL WORKS, CARNEGIE BROTHERS & CO. LIMITED, Bessemer Station, Allegheny county. Office at Pittsburgh. Three 10-ton converters. Made first blow August 25, 1875.

HOMESTEAD STEEL WORKS, CARNEGIE, PHIPPS & CO. LIMITED, Pittsburgh. Two 4-ton converters. Made first blow March 19, 1881.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. One 7-ton converter. Made first blow March 15, 1886.

LACKAWANNA IRON AND STEEL WORKS, LACKAWANNA IRON AND COAL COMPANY, Scranton. Two 5-ton converters. Made first blow October 23, 1875.

PENNSYLVANIA STEEL WORKS, PENNSYLVANIA STEEL COMPANY, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Two 7-ton and three 8-ton converters. Made first blow in June, 1867. Pittsburgh Steel Casting Company, Pittsburgh. One 5-ton converter. Made first blow August 26, 1881.

Pottstown Iron Company, Pottstown, Montgomery county. Two 10-gross-ton converters. Made first blow July 1, 1886.

SCRANTON STEEL COMPANY, Scranton. Two 6-ton converters. Made first blow March 29, 1883.

#### WEST VIRGINIA—2.

Riverside Iron Works, Wheeling. Two 5-ton converters. Made first blow June 11, 1884.

Wheeling Steel Works, Wheeling. Two 5-ton converters. Made first blow August 12, 1886.

#### TENNESSEE—1 COMPLETED AND 1 BUILDING.

ROANE IRON COMPANY, Chattanooga. Building a steel plant with one converter.

South Tredegar Iron Company, Chattanooga. One 2-ton converter. Made first blow April 19, 1886.

#### OHIO—4 COMPLETED AND 1 BUILDING.

Bellaire Nail Works, Bellaire, Belmont county. Two 5-ton converters. Made first blow April 28, 1884.

CLEVELAND ROLLING MILL COMPANY, Cleveland. Two 10-ton converters. Made first blow October 15, 1868.

Jefferson Iron Works, Steubenville, Jefferson county. Building a steel plant to contain two 3-ton converters.

Laughlin and Junction Steel Company, Mingo Junction, Jefferson county. Two 5-ton converters. Made first blow February 8, 1886.

Otis Iron and Steel Company, Cleveland. Two 5-ton converters. Made first blow August 5, 1884.

#### INDIANA—1.

Etna Iron and Steel Works, Crown Point. Office, 184 and 186 Washington st., Chicago. One 1-ton converter. Built in 1886.

#### ILLINOIS—4 COMPLETED AND 1 BUILDING.

Belleville Nail Company, Belleville, St. Clair county. Building a steel plant to contain two 3-ton converters.

JOLIET STEEL WORKS, JOLIET STEEL COMPANY, Joliet. Office, Home Insurance Building, Chicago. Two 8-ton converters. Made first blow January 26, 1873.

NORTH CHICAGO ROLLING MILL COMPANY, 17 Metropolitan Block, Chicago. Two 6-ton converters. Made first blow April 10, 1872.

NORTH CHICAGO ROLLING MILL COMPANY, South Chicago. Office, 17 Metropolitan Block, Chicago. Three 10-ton converters. Made first blow June 14, 1882.

UNION STEEL COMPANY, First National Bank Building, Chicago. Two 10-ton converters. Made first blow July 26, 1871.

#### MISSOURI—1.

WESTERN STEEL COMPANY, St. Louis. Two 7-ton converters. Made first blow September 1, 1876.

#### COLORADO—1.

COLORADO COAL AND IRON COMPANY, South Pueblo. Two 5-ton converters. Made first blow April 11, 1882.

#### UNITED STATES.

Total number of Bessemer steel works: 27 completed, and 7 building.

Number of converters: 58 completed, and 12 building.

## CLAPP-GRIFFITHS STEEL WORKS.

#### NEW YORK—1.

Port Henry Steel and Iron Company, Port Henry, Clinton county. One 3-ton converter. Made first blow February 16, 1886.

#### PENNSYLVANIA—4 COMPLETED AND 2 BUILDING.

Glasgow Iron Company, Pottstown, Montgomery county. Two 3-ton converters. Made first blow May 11, 1886.

Lickdale Iron Company, Lebanon. Building one 3-ton converter.

McCormick & Co., Harrisburg, Dauphin county. One 3-ton converter. Made an experimental blow April 27, 1886.

Oliver Brothers & Phillips, Pittsburgh. Two 2-ton converters. Made first blow March 25, 1884.

Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two 3-ton converters. Made first blow February 2, 1886.

Spang Steel and Iron Company, Pittsburgh. Building two 3-ton converters.

#### ILLINOIS—1.

Western Nail Company, Belleville, St. Clair county. Two 3-ton converters. Made first blow January 21, 1886.

#### UNITED STATES.

Total number of works: 6 completed, and 2 building. Number of converters: 10 completed, and 3 building.



## OPEN-HEARTH STEEL WORKS.

NOTE.—These works are fully described in the list of rolling mills. The ton here used is the ton of 2,240 pounds. The works which make steel castings exclusively are so described; the others make plates, sheets, bars, billets, forgings, and a small quantity of rails. The names of the works which occasionally make open-hearth steel rails are printed in SMALL CAPS.

### NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. One 10-ton Siemens furnace.

### MASSACHUSETTS—4.

Bay State Steel Company, 191 High st., Boston. One 7-ton open-hearth furnace.

Norway Steel and Iron Company, 23 Mason Building, Boston. Three 10-ton Siemens furnaces.

Washburn and Moen Manufacturing Company, Worcester. One 12-ton Siemens furnace.

Worcester Steel Works, Worcester. One 12-ton Siemens furnace.

### NEW YORK—1.

Johnson (Isaac G.) & Co., Spuyten Duyvil. One 8-ton open-hearth furnace. Product, steel castings.

### NEW JERSEY—1.

Newark Steel Works, Benjamin Atha & Co., Newark. One 7-ton Siemens furnace.

### PENNSYLVANIA—EASTERN DISTRICT—4 COMPLETED AND 2 BUILDING.

Bethlehem Iron Company, Bethlehem. Two 15-ton Siemens-Pernot furnaces standing in an advanced stage of construction.

Chester Rolling Mills, Thurlow, Delaware county. Two 15-ton Siemens furnaces.

Midvale Steel Company, Nicetown P. O., Philadelphia. One 7-ton, one 12-ton, and one 15-ton Siemens furnace.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works near Manayunk. Building two 15-ton Siemens furnaces.

Pottstown Iron Company, Pottstown. One 10-ton Siemens open-hearth furnace.

Standard Steel Casting Company, Thurlow, Delaware county. One 10-ton Siemens furnace. Product, steel castings.

## PENNSYLVANIA—CENTRAL DISTRICT—2.

NORTH BRANCH STEEL COMPANY, Danville. Philadelphia office, 330 Walnut st. One 15-ton Siemens furnace.

PENNSYLVANIA STEEL COMPANY, Steelton. Office, 208 South Fourth st., Philadelphia. Two 30-ton Siemens furnaces.

## PENNSYLVANIA—WESTERN DISTRICT—16 COMPLETED AND 2 BUILDING.

Apollo Iron and Steel Company, Pittsburgh. Works at Apollo, Armstrong county. Two 15-ton Siemens furnaces.

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

CAMBRIA IRON COMPANY, Johnstown. Two 15-ton Siemens-Pernot furnaces, and one 12-ton Krupp washer which can be used as an open-hearth furnace by changing the bottom.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Two 12-ton Siemens open-hearth furnaces. Product, steel castings exclusively.

Homestead Steel Works, Carnegie, Phipps & Co. Limited, Pittsburgh. Building four 35-ton Siemens furnaces.

Hussey, Howe & Co. Limited, Pittsburgh. One 35-ton Siemens open-hearth furnace.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 12-ton Siemens furnaces.

La Belle Steel Works, Smith Bros. & Co., Pittsburgh. One 15-ton Siemens furnace.

Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg. Office, Iron Exchange Building, Pittsburgh. One 10-ton Siemens open-hearth furnace.

Linden Steel Company Limited, Pittsburgh. One 10-ton and one 15-ton Siemens furnace.

Millvale Rolling Mill, Graff, Bennett & Co., Pittsburgh. Building two 15-ton Siemens furnaces.

National Tube Works Company, McKeesport, Allegheny county. One 10-ton Siemens furnace.

Pennsylvania Iron Works, Everson, Hammond & Co. Limited, Pittsburgh. One 10-ton Siemens furnace.

Pittsburgh Steel Works, Anderson, DuPuy & Co., Pittsburgh. One 20-ton Siemens furnace.

Singer, Nimick & Co. Limited, Pittsburgh. One 10-ton Siemens open-hearth furnace.

Soho Iron Mills, Moorhead & Co., Pittsburgh. Two 15-ton Siemens furnaces.

Spang Steel and Iron Company Limited, Pittsburgh. Three 10-ton Siemens furnaces.

West Penn Steel Works, Jennings, Beale & Co., Stevenson Building, Pittsburgh. Works at Leechburg, Armstrong county. One 10-ton Siemens furnace.

## KENTUCKY—1.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Ky. One 7-ton Siemens furnace.

## TENNESSEE—1.

ROANE IRON COMPANY, Chattanooga. Two 10-ton Siemens furnaces.

## OHIO—7 COMPLETED AND 2 BUILDING.

Burgess Steel and Iron Works, Portsmouth. One 8-ton Siemens furnace.  
Canton Steel Works, Bolton Steel Company, Canton. One 10-ton Siemens furnace.

Cleveland Rolling Mill Company, Cleveland. Three 7-ton and two 15-ton Siemens furnaces.

Columbus Steel Company, Columbus. Building two 15-ton Siemens furnaces.

Otis Iron and Steel Company, Cleveland. Four 15-ton Siemens furnaces.

Portsmouth Iron and Steel Works, John Means, Trustee, Ashland, Ky. Works at Portsmouth, Ohio. One 10-ton Siemens furnace.

Solid Steel Company, Alliance, Stark county. One 3-ton open-hearth furnace. Product, steel castings.

Youngstown Steel Company, Youngstown. One 20-ton Siemens furnace.

Zanesville Iron Works, Ohio Iron Company, Zanesville. Building one 10-ton Siemens furnace.

## INDIANA—1 COMPLETED AND 2 BUILDING.

Ætna Iron and Steel Works, 184 and 186 Washington st., Chicago. Works at Crown Point, Indiana. One small open-hearth furnace. Product, steel castings.

Chicago Steel Manufacturing Company, First National Bank Building, Chicago. Works at Hammond, Indiana. Building three 15-ton Siemens furnaces.

INDIANAPOLIS ROLLING MILL COMPANY, Indianapolis. Building two 15-ton Siemens furnaces.

## ILLINOIS—2.

Calumet Iron and Steel Company, Chicago. Four 4-ton Siemens furnaces.

SPRINGFIELD IRON COMPANY, Springfield. Two 20-ton Siemens-Pernot furnaces.

## CALIFORNIA—1.

PACIFIC ROLLING MILL COMPANY, 16 First st., P. O. Box 2,032, San Francisco. One 5 and one 18-ton Siemens furnace.

## UNITED STATES.

Total number of open-hearth steel works in the United States: 42 completed, 7 building, and one standing nearly completed. Number of furnaces: 71 completed, 18 building, and 2 standing nearly completed.

## CRUCIBLE CAST-STEEL WORKS.

NOTE.—These steel works are fully described in the list of rolling mills. Their capacity is here indicated by the number of pots which each works can use at one heat. Unless otherwise indicated their product is merchant steel.

### MASSACHUSETTS—1.

Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester. 48 pots. Product used exclusively for car-wheel tires.

### CONNECTICUT—3.

Collins Company, Collinsville, Hartford county. 180 pots. Product used in the manufacture of edge tools.

Farist Steel Company, Bridgeport. 96 pots. (Including 24 pots added since the list of rolling mills was printed.)

Windsor Locks Steel Company, Windsor Locks. 40 pots.

### NEW YORK—4.

Chrome Steel Works, Kent avenue and Keap st., Brooklyn. 96 pots.

Johnson (Isaac G.) & Co., Spuyten Duyvil. 20 pots. Product, steel castings.

Monhagen Steel Works, Wheeler, Madden and Clemson Manufacturing Company, Middletown, Orange county. 96 pots. Product used in making saws.

Sanderson Brothers Steel Company, Syracuse. 64 pots.

### NEW JERSEY—5.

Heller & Brothers, Newark. 48 pots. Product used in making tools.

Jersey City Steel Company, Jersey City. 320 pots.

Newark Steel Works, Benjamin Atha & Co., Newark. 144 pots.

Pompton Steel and Iron Company, Pompton, Passaic county. 160 pots.

West Bergen Steel Works, Spaulding, Jennings & Co., Jersey City. 96 pots.

### PENNSYLVANIA—21.

Beaver Falls Steel Works, Beaver Falls, Beaver county. 24 pots.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh.

Decline to give information.

Burgess, (Charles,) Titusville, Crawford county. 12 pots.

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. 180 pots.

Fairmount Steel Works, Alexander Foster & Co., 2,325 Spring Garden st., Philadelphia. 24 pots.

- Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. 12 pots. Product, steel castings.
- Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. 60 pots.
- Frankford Steel Company, Frankford P. O., Philadelphia. 40 pots.
- Hussey, Binns & Co. Limited, Pittsburgh. 24 pots. Product used in making shovels and spades.
- Hussey, Howe & Co. Limited, Pittsburgh. 204 pots.
- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Tacony, Philadelphia. 100 pots. Product used in making saws, etc.
- La Belle Steel Works, Smith Bros. & Co., Pittsburgh. 120 pots.
- Midvale Steel Company, Nicetown P. O., Philadelphia. 48 pots.
- Nellis's Agricultural Works, A. J. Nellis Company, Pittsburgh. 20 pots. Product used for agricultural implements.
- Oxford Iron and Steel Works, William & Harvey Rowland, Frankford P. O., Philadelphia. 48 pots.
- Pittsburgh Steel Casting Company, Pittsburgh. 72 pots. Steel castings.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 107 Wood st., Pittsburgh. 66 pots.
- Singer, Nimick & Co. Limited, Pittsburgh. 258 pots.
- Standard Steel Casting Company, Thurlow, Delaware county. 18 pots. Product, steel castings.
- Sterling Steel Company Limited, 91 Fifth avenue, Pittsburgh. Works at Demmler. 48 pots.
- Wayne Iron and Steel Works, Brown & Co., Pittsburgh. 162 pots.

## MARYLAND—1.

- Crown and Cumberland Steel Company, Cumberland. Office, Pittsburgh, Pa. 24 pots.

## TENNESSEE—1.

- Southern Steel Works, Chattanooga. 4 pots.

## OHIO—1.

- Burgess Steel and Iron Works, Portsmouth, Scioto county. 24 pots.

## INDIANA—1.

- Ætna Iron and Steel Works, 184 and 186 Washington st., Chicago. Works at Crown Point, Indiana. 4 pots. Product, steel castings.

## ILLINOIS—1.

- Crucible Steel Company, 46 West Monroe st., Chicago. 20 pots. Product, steel castings.

## MICHIGAN—1.

- Detroit Steel and Spring Works, First and Larned sts., Detroit. 30 pots.

## UNITED STATES.

- Total number of crucible cast-steel works in the United States: 40.  
Number of pots, 3,391.

## WIRE-ROD AND WIRE MILLS.

NOTE.—Those works which do not draw wire but which roll rods are indicated by the word "rods" placed after their names. For a more complete description of the rod mills see the list of rolling mills.

### MAINE—1.

Eastern Wire Works, Harrison.

### MASSACHUSETTS—11.

Cambridge Rolling Mills, Gilmore & Eustis, Cambridgeport. Rods.

George C. Prouty, Charlton City.

Gosnold Mills, New Bedford. Rods.

Lamb (Horace) & Co., Northampton.

Leicester Wire Company, Leicester.

Norway Steel and Iron Company, Boston. Rods.

Palmer Wire Manufacturing Company, Palmer.

Prentiss (G. W.) & Co., Holyoke.

Spencer Wire Company, Spencer.

Washburn and Moen Manufacturing Company, Worcester. Rods and wire.

Worcester Wire Company, Worcester.

### RHODE ISLAND.—1.

American Screw Company, Providence.

### CONNECTICUT—5.

Ansonia Brass and Copper Company, Ansonia.

Birmingham Rolling Mill, Peck, Stow, and Wilcox Company, Birmingham. Rods.

Gilbert and Bennett Manufacturing Company, Georgetown.

New Haven Rolling Mill Company, New Haven. Rods.

New Haven Wire Company, New Haven.

### NEW YORK—6.

Carey & Moen, 234 West 29th st., New York City.

Griswold, (J. Wool,) Troy.

Syracuse Iron Works, Syracuse. Rods.

Troy Steel and Iron Company, Troy. Rods.

Westerman Rolling Mill, Westerman & Co., Lockport. Rods.

Wolff (R. H.) & Co. Limited, 117th and 118th sts. and Harlem River, New York City.

## NEW JERSEY—3.

John A. Roebling's Sons Company, Trenton. Rods and wire.  
New Jersey Steel and Iron Company, Trenton. Rods.  
Trenton Iron Company, Trenton. Rods and wire.

## PENNSYLVANIA—12 COMPLETED AND 1 BUILDING.

Braddock Wire Company, Pittsburgh. Rods and wire.  
Cambria Iron Company, Johnstown. Rods.  
Gautier Steel Department of Cambria Iron Company, Johnstown.  
Rods and wire.  
Hartman Steel Company Limited, Beaver Falls. Rods and wire.  
Hazard Manufacturing Company, Wilkesbarre.  
Howard Iron Works, Bernard Lauth, Howard, Centre county. Rods.  
Iowa Barb Wire Company, 98 Reade st., New York. Building works  
at Allentown, Pa., to draw, galvanize, and barb wire.  
Lehigh and Franklin Wire Mills, Stewart & Co., Easton.  
Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county.  
Rods and wire.  
New Castle Nail Company, New Castle. Draw steel wire for nails.  
Oliver and Roberts Wire Company Limited, Pittsburgh. Rods and wire.  
Philadelphia Wire Works, Thomas Hamilton, 1,340 Vienna st., Phila.  
Williamsport Iron and Nail Works, Milton Iron Company, Williams-  
port. Rods.

## MARYLAND—1.

Canton Wire Works, Canton.

## OHIO—8.

American Wire Company, Cleveland. Rods and wire.  
Belmer (H.) & Co., Cincinnati.  
Cleveland Rolling Mill Company, Cleveland. Rods and wire.  
Columbus Iron Works, P. Hayden Saddlery Hardware Company, Co-  
lumbus. Rods.  
Globe Rolling Mill Company, Cincinnati. Rods and wire.  
H. P. Nail Company, Cleveland. Rods and wire.  
Otis Iron and Steel Company, Cleveland. Rods.  
Salem Wire Nail Company, Salem.

## ILLINOIS—5.

Ashley Wire Company, Joliet.  
Grant & Co., Lockport.  
Kraft, Gross & Co., Joliet.  
Lambert and Bishop Wire Fence Company, Joliet.  
Union (The) Steel Company, Chicago. Rod and wire mills unused.

## MISSOURI—2.

Harrison Wire Company, St. Louis. Rods and wire. Idle.  
St. Louis Wire Mill Company, St. Louis.



## CALIFORNIA—1.

California Wire Works, 329 Market st., P. O. Box 2,050, San Francisco.

## UNITED STATES.

Total number of wire-rod and wire mills in the United States: 56 completed and one building.

## BRASS AND COPPER WIRE—13.

NOTE—Some of the works in the preceding list make copper and brass wire as well as iron and steel wire. The following establishments make brass and copper wire, but not iron or steel wire.

Bridgeport Brass Company, Bridgeport, Conn.  
 Brooklyn Brass and Copper Company, Brooklyn, N. Y.  
 Brown & Brothers, Waterbury, Conn.  
 Detroit Copper and Brass Rolling Mills, Detroit, Mich.  
 DeWitt Wire Cloth Company, Belleville, New Jersey.  
 Hendricks Brothers, Belleville, N. J. New York office, 49 Cliff st.  
 Holmes, Booth & Haydens, Waterbury, Conn.  
 Lockwood, (D. & J.), Cannon's Station, Conn.  
 Manhattan Brass Company, 469 First avenue, New York.  
 Plume and Atwood Manufacturing Company, Thomaston, Conn.  
 Rome Iron Works, Rome, N. Y.  
 Stainer & Laffy, Belleville, N. J.  
 Waterbury Brass Company, Waterbury, Conn.

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## WIRE-NAIL WORKS.

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NOTE.—Very few of these works draw the wire which they use, but in some cases they roll rods as well as draw wire. The works which roll rods are fully described in the list of rolling mills.

## MASSACHUSETTS—8.

American Tack Company, Fairhaven. Number of machines, 20.  
 Clark & Dow, Haverhill.  
 Dunbar, Hobart & Whidden, South Abington.  
 Field (A.) & Sons, Taunton.  
 Larned, (S. H.), Worcester.  
 Phillips (E.) & Sons, South Hanover.  
 Taunton Tack Company, Taunton.  
 Wire (The) Goods Company, Worcester.

## RHODE ISLAND—1.

American Screw Company, Providence. Draw wire and make wire nails.

## CONNECTICUT—1.

Russell and Erwin Manufacturing Company, New Britain. Office, 45 Chambers st., New York City.

## NEW YORK—5.

Brooklyn Wire Nail Company, 17 Broadway, New York City.

Farmer (The) Manufacturing Company, Penn Yan.

Hassall, (W.), 63 and 65 Elizabeth st., New York City.

Metropolitan Wire Nail Company, New York City.

New York Wire Nail Company, (Kaufman Brothers,) 12 First st., New York City.

## PENNSYLVANIA—4.

Hartman Steel Company Limited, Beaver Falls. Roll rods, draw wire, and make wire nails.

New Castle Nail Company, New Castle. Draw wire and make wire nails.

Pennsylvania Tack Company, Norristown.

Philips & Townsend, 1,308 Howard st., Philadelphia.

## KENTUCKY—1.

American Wire Nail Company, Covington.

## OHIO—2.

H. P. Nail Company, Cleveland. Roll rods, draw wire, and make wire nails. Number of wire-nail machines, 125.

Salem Wire Nail Company, Salem. Draw wire and make wire nails.

## INDIANA—1.

United States Wire Nail Company, Indianapolis. Number of wire-nail machines, 17.

## IOWA—1.

Council Bluffs Tack and Wire Nail Company, Council Bluffs.

## MICHIGAN—1.

Standard Nail Company, Detroit.

## NEBRASKA—1.

Omaha Barb Wire Company, Omaha.

## CALIFORNIA—1.

Pacific Iron and Nail Company, 9 Beale st., San Francisco. Number of wire-nail machines, 4.

## UNITED STATES.

Total number of wire-nail works in the United States: 27.

## CAR-AXLE WORKS.

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### MAINE—1.

Eastern Forge Company, Portland.

### NEW HAMPSHIRE—2.

Cole Manufacturing Company, Lake Village.  
Nashua Iron and Steel Company, Nashua.

### MASSACHUSETTS—3.

Boston Forge Company, Boston.  
Bridgewater Iron Company, Bridgewater.  
Cape Ann Anchor Works, Gloucester.

### RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence.

### CONNECTICUT—2.

Bridgeport Steam Forge, Bridgeport.  
Winsted Iron Company, Winsted.

### NEW YORK—5.

DeLaney Forge and Iron Company, Buffalo.  
Gould & Stimson, 24 Hayen Building, Buffalo.  
Sizer, (W. S.), Steam Forge, Buffalo.  
Troy Steel and Iron Company, Troy.  
Wood, (William W.), Wood's Falls.

### NEW JERSEY—3.

Macpherson, Willard & Co., Bordentown.  
Paterson Iron Company, Paterson.  
Taylor Iron Works, High Bridge. Annual capacity, 30,000 axles.

### PENNSYLVANIA—25.

Allentown (The) Rolling Mills, Allentown.  
Atglen Axle and Iron Manufacturing Company Limited, Atglen.  
Bethlehem Iron Company, Bethlehem.  
Cambria Iron Company, Johnstown.  
Carnegie, Phipps & Co. Limited, Pittsburgh.  
Catasauqua Manufacturing Company, Catasauqua.  
Cayuta Forge and Axle Company, Sayre.  
Dickson Manufacturing Company, Scranton.  
Erie Forge Company Limited, Erie.  
Frankford Steel Company, Frankford, Philadelphia.  
Green Ridge Iron Works, A. L. Spencer, Scranton.

Jackson and Woodin Manufacturing Company, Berwick.  
Lackawanna Iron and Coal Company, Scranton.  
Lehigh Car Wheel and Axle Works, McKee, Fuller & Co., Catasauqua.  
Midvale Steel Company, Nicetown, Philadelphia.  
Milton Iron Company, Milton.  
Montour Iron and Steel Company, Danville.  
Old Fort Iron Mills, Brownsville. Idle.  
Pencoyd Iron Works, A. & P. Roberts & Co., Philadelphia.  
Penn Iron Company Limited, Lancaster.  
Pennsylvania Steel Company, Steelton.  
Pittsburgh Forge and Iron Company, Pittsburgh.  
Standard Steel Works, Lewistown.  
Vulcan Forge and Iron Works, Long & Co., Pittsburgh.  
Ward Axle, Brake, and Coupling Manufacturing Company, Monongahela City. Office, 87 Diamond st., Pittsburgh.

## DELAWARE—1.

Johnson Forge Company, Wilmington.

## MARYLAND—1.

Baltimore and Ohio Railroad Company, Cumberland.

## VIRGINIA—3.

Johnson (J. R.) & Co., Richmond.  
Old Dominion Iron and Nail Works, Richmond.  
Tredegar Iron Works, Tredegar Company, Richmond.

## ALABAMA—1.

Anniston Rolling Mill, Noble Brothers & Co., Anniston.

## WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington.

## KENTUCKY—2.

Louisville Steam Forge Company, Louisville.  
Swift's Iron and Steel Works, Newport. Office, Cincinnati.

## OHIO—7.

Akron Forge Company, Akron.  
Cincinnati Steam Forge Company, Cincinnati.  
Cleveland City Forge and Iron Company, Cleveland.  
Cleveland Rolling Mill Company, Cleveland.  
Lake Erie Iron Company, Cleveland.  
Lima Machine Works, Lima.  
Otis Iron and Steel Company, Cleveland.

## INDIANA—3.

Bass Foundry and Machine Works, Fort Wayne.  
Central Iron and Steel Company, Brazil.  
New Albany Steam Forge, New Albany.

## ILLINOIS—6.

Ajax Forge Company, Chicago.  
Chicago Forge and Bolt Company, Chicago.  
Pullman's Palace Car Company, Pullman.  
Rust & Coolidge, Chicago.  
Western Forge and Rolling Mills, East St. Louis.  
Willard Sons & Bell Company, Chicago.

## MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis.  
St. Louis Steam Forge and Iron Works, A. McDonald & Bro., St. Louis.

## MICHIGAN—3.

Baugh Steam Forge Company, Detroit.  
Detroit Bridge and Iron Works, Detroit.  
Michigan Car Company, Detroit.

## WISCONSIN—1.

De Pere Steam Forge, West De Pere.

## COLORADO—1.

Colorado Coal and Iron Company, South Pueblo.

## UTAH TERRITORY—1.

Silver Iron Works, Wm. J. Silver, Salt Lake City.

## CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco.

## UNITED STATES.

Total number of car-axle works in the United States: 76.

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## CAR-WHEEL WORKS.

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(Exclusive of railroad companies. For a part of the information in this list we are indebted to the *National Carbuilder*.)

## MAINE—2.

McCullough & Tait, Calais. Product, chilled cast iron wheels.  
Portland Company, Portland. Product, cast iron wheels.

## NEW HAMPSHIRE—3.

Ford & Kimball, Concord. Product, cast iron wheels.  
Laconia Car Company, Laconia. Product, cast iron wheels.  
Nashua Iron and Steel Company, Nashua. Product, hardened steel-tired wheels.

## VERMONT—3.

- Miltimore Elastic Steel Car Wheel Company, Arlington. Product, steel wheels.  
Rutland Foundry and Machine Company, Rutland. Product, cast iron wheels.  
St. Albans Foundry, St. Albans. Product, cast iron wheels.

## MASSACHUSETTS—5.

- Allston Steel Wheel Company, Allston. Product, steel-tired wheels.  
Boston Standard Wheel Company, Boston. Product, cast iron wheels.  
Mason Machine Works, Taunton. Product, cast iron wheels.  
Wason Manufacturing Company, Springfield. Product, cast iron wheels.  
Annual capacity, 20,000.  
Worcester Steel Works, Worcester. Product, cast iron tram-car wheels.  
Annual capacity, 25,000.

## CONNECTICUT—2.

- Barnum Richardson Company, Wm. H. Barnum, President, Lime Rock.  
Product, chilled iron wheels.  
Washburn Car Wheel Company, Hartford. Product, crucible-steel-tired wheels.

## NEW YORK—13.

- Albany Car Wheel Works, Albany. Product, cast iron wheels.  
Allen Paper Car Wheel Company, Hudson. Product, steel-tired wheels, paper centres. Annual capacity, 12,000.  
Andrews & Cloony, New York City. Product, cast iron wheels.  
Atwood Hemp Car Wheel Company, New York City.  
Brooks Locomotive Works, Dunkirk. Product, Thurber steel wheels.  
Brown & Trude, East Buffalo. Product, cast iron wheels.  
Buffalo Car Wheel Works, Buffalo. Product, cast iron wheels.  
Griffin (Thos. F.) & Sons, Buffalo. Product, cast iron wheels. Annual capacity, 70,000.  
Heartt (Jonas S.) & Co., Troy. Product, cast iron wheels.  
Kingsford, (Thomas,) Oswego. Product, cast iron wheels.  
Ramapo Wheel and Foundry Company, Ramapo. Product, cast chilled iron wheels and steel-tired wheels. Annual capacity, 60,000 cast iron and 6,000 steel-tired.  
Rochester Car Wheel Company, Rochester. Product, cast iron wheels.  
Thacher (Geo. H.) & Co., Albany. Product, cast iron wheels.

## NEW JERSEY—5.

- Jersey City Wheel Foundry and Machine Works, Jersey City. Product, cast iron wheels, and Thomas steel-tired wheels.  
Taylor Iron Works, High Bridge. Product, chilled iron wheels and steel-tired wheels. Annual capacity, 36,000 cast iron and 5,000 steel-tired.  
Thompson, (L. P.), Bordentown. Product, cast iron wheels.

Washburn, Hunts & Co., Jersey City. Product, cast iron wheels.  
Washburn Cast Steel Car Wheel Company, Raritan. Product, cast steel wheels.

## PENNSYLVANIA—18.

Cayuta Wheel and Foundry Company, Sayre. Product, cast iron wheels. Annual capacity, 100,000.  
Chester Steel Castings Company, 407 Library st., Philadelphia. Product, cast steel wheels.  
Connellsville Machine and Car Works, Connellsville. Product, cast iron pit-car wheels. Annual capacity, 20,000.  
Davenport, Fairbairn & Co., Erie. Product, cast iron wheels.  
Dickson Manufacturing Company, Scranton. Product, steel wheels.  
Dickson Manufacturing Company, Wilkesbarre. Product, cast iron wheels.  
Harman & Hassert, Bloomsburg. Product, cast iron wheels.  
Harrisburg Car Manufacturing Company, Harrisburg. Product, cast iron wheels.  
Hazleton Iron Works, Allison, John & Co., Hazleton. Product, cast iron wheels. Daily capacity, 50.  
Hodge Manufacturing Company Limited, Greenville. Product, cast iron wheels.  
Huntingdon Car and Car Wheel Works, Huntingdon. Product, cast iron wheels.  
Jackson and Woodin Manufacturing Company, Berwick. Product, cast iron wheels. Annual capacity, 70,000.  
Lehigh Car Wheel & Axle Works, McKee, Fuller & Co., Catasauqua. Product, cast iron wheels.  
Marshall (John), Kittanning. Product, cast iron wheels.  
McCaskey Car Wheel Company, New Castle. Product, cast iron wheels.  
Redstone Foundry, Uniontown. Product, cast iron wheels.  
Sax (J. K.), Pittston. Product, cast iron wheels.  
Whitney (A.) & Sons, Callowhill and Sixteenth sts., Philadelphia. Product, cast iron wheels. Highest number cast in one day, 374.

## DELAWARE—1.

Lobdell Car Wheel Company, Wilmington. Product, chilled iron wheels. Daily capacity, 500.

## MARYLAND—1.

Baltimore Car Wheel Company, Fulton Junction, Baltimore. Product, chilled iron wheels. Daily capacity, 400.

## VIRGINIA—2.

Atlantic Iron Works, W. A. Anderson, Norfolk. Product, cast iron wheels. Annual capacity, 200 to 300.  
Tredegar Company, Richmond. Product, cast iron wheels.

## ALABAMA—3.

Linn Iron Works, Birmingham. Product, cast iron wheels.



Noble Brothers & Co., Anniston. Product, cast iron wheels. Annual capacity, 66,340.

Peacock (George), Selma. Product, cast iron wheels.

TEXAS—1.

Marshall Car Wheel and Foundry Company, Marshall. Product, cast iron wheels. Annual capacity, 50,000.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Product, cast iron chilled wheels. Annual capacity, 48,000.

KENTUCKY—1.

Louisville Car Wheel and Railway Supply Company, Louisville. Product, cast iron wheels.

TENNESSEE—2.

Knoxville Car Wheel Company, Knoxville. Product, cast iron wheels.  
Wason Car and Foundry Company, Chattanooga. Product, cast iron wheels.

OHIO—12.

Barney and Smith Manufacturing Company, Dayton. Product, cast iron wheels. Annual capacity, 45,000.

Bowler & Co., Cleveland. Product, chilled and steel-tired wheels. Annual capacity, 36,000.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Product, self-oiling, chilled, mine-car wheels. Annual capacity, 15,000.

Fulton Foundry Company, Cleveland. Product, chilled iron wheels.

Gill Car Manufacturing Company, Columbus. Product, cast iron wheels.

Lake Shore Foundry, Cleveland. Product, cast iron wheels.

Lima Machine Works, Lima. Product, cast iron and steel-tired wheels. Annual capacity, 1,500 tons.

Maher & Brayton, Cleveland. Product, cast iron wheels.

Mowry Car Wheel Works, Cincinnati. Product, cast iron wheels.

Nelsonville Foundry and Machine Company, Nelsonville. Product, cast iron wheels.

Paige Car Wheel Company, 211 Superior st., Cleveland. Product, steel-tired plate and spoke wheels. Annual capacity, 10,000.

Watt (The) Mining Car Wheel Company, Barnesville. Product, cast iron wheels.

INDIANA—7.

Bass Foundry and Machine Works, Fort Wayne. Product, cast iron wheels.

Haskell and Barker Car Company, Michigan City. Product, cast iron wheels.

Indianapolis Car and Manufacturing Company, Indianapolis. Product, cast iron wheels.

Lafayette Car Wheel Works, Lafayette. Product, cast iron wheels.

Ohio Falls Car Company, Jeffersonville. Product, cast iron wheels.  
Steadman & Co., Aurora. Product, cast iron wheels.  
Terre Haute Car and Manufacturing Company, Terre Haute. Product, cast iron wheels.

## ILLINOIS—9.

Allen Paper Car Wheel Company, Pullman, Cook county, and Morris, Grundy county. Two works. Product, paper wheels. Total annual capacity, 24,000.  
Barnum Richardson Manufacturing Company, Chicago. Product, cast iron wheels.  
Bass (J. H.), Chicago. Product, cast iron wheels.  
Bouton & Co., Aurora. Product, cast iron wheels. Annual capacity, 36,000.  
Chicago Car Wheel Company, Chicago. Product, cast chilled iron and steel-tired wheels. Annual capacity, 40,000.  
Griffin Wheel and Foundry Company, Chicago. Product, cast iron wheels. Annual capacity, 60,000.  
Litchfield Car Manufacturing Company, Litchfield. Product, cast iron wheels.  
Union Foundry and Pullman Car Wheel Works, 217 First National Bank Building, Chicago. Product, cast iron wheels. Annual capacity, 100,000.

## MISSOURI—6.

Green's Car Wheel Manufacturing Company, St. Louis. Product, cast iron wheels.  
Missouri Car and Foundry Company, St. Louis. Product, cast iron wheels.  
Moore & Moss, Kansas City. Product, cast iron wheels.  
St. Charles Car Company, St. Charles. Product, cast iron wheels. Annual capacity, 36,000.  
St. Louis Car Wheel Company, St. Louis. Product, cast iron wheels.  
Treat (C. A.) Manufacturing Company, Hannibal. Product, cast iron wheels. Annual capacity, 4,500.

## MICHIGAN—5.

Butterworth & Lowe, Grand Rapids. Product, cast iron wheels. Annual capacity, 9,000.  
Detroit Car Wheel Works, Detroit. Product, cast iron wheels.  
Griffin Car Wheel Company, Detroit. Product, chilled charcoal iron wheels. Annual capacity, 120,000.  
Peninsular Car Company, Detroit. Product, cast iron wheels. Annual capacity, 70,000.  
Russell Wheel and Foundry Company, Detroit. Product, cast iron wheels.

## WISCONSIN—2.

Doty Manufacturing Company, Janesville. Product, cast iron wheels.  
May, Swallow & Co., Milwaukee. Product, cast iron wheels.

## MINNESOTA—2.

Menzel & Ferguson, Northwestern Foundry, Minneapolis. Product, cast iron wheels. Annual capacity, 6,000.

St. Paul Foundry Company, St. Paul. Product, cast iron wheels. Annual capacity, 10,000.

## CALIFORNIA—2.

Risdon Iron and Locomotive Works, San Francisco. Product, cast iron wheels.

Steiger & Kerr, 137 First st., San Francisco. Product, cast iron wheels.

## UNITED STATES.

Total number of car-wheel works in the United States: 108.

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## CARBUILDERS.

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NOTE.—Those companies or firms which make street cars only are so mentioned; those which make both railroad cars and street cars are indicated by the word "both" after their addresses; all others make railroad cars only. For a part of the information in this list we are indebted to the *National Carbuilder*.

## MAINE—2.

Lombard (Thomas), Augusta.  
Portland Company, Portland.

## NEW HAMPSHIRE—1.

Laconia Car Company, Laconia.

## MASSACHUSETTS—4.

Bradley Car Works, Worcester.  
Keith Manufacturing Company, Hyannis.  
Keith Manufacturing Company, Sagamore.  
Wason Manufacturing Company, Springfield.

## NEW YORK—10.

Buffalo Car Manufacturing Company, Buffalo.  
Feigel Car Company, New Utrecht, Long Island. Both.  
Gilbert Car Manufacturing Company, Troy.  
Jones Car Works, Schenectady. (Leased to New York Central Sleeping Car Company.)  
Jones's (J. M.) Sons, West Troy. Street cars only.  
New York Central Sleeping Car Company, Schenectady.  
Pioneer Iron Works, Brooklyn.

Stephenson (The John) Company Limited, New York City. Street cars only.

Stuebner & Woods, Long Island City. Coal cars.

Turls Iron Works, New York City.

PENNSYLVANIA—28.

Allison Manufacturing Company, Philadelphia.

Altoona Car Works, Altoona.

Billmeyer and Small Company, York.

Brill (J. G.) & Co., Philadelphia. Both.

Carlisle Manufacturing Company, Carlisle.

Connellsville Machine and Car Works, Connellsville.

Conshohocken Car Works, Conshohocken.

Dauphin Car Works, Dauphin.

Erie Car Works, Erie.

Glen Rock Manufacturing Company, Glen Rock.

Harrisburg Car Manufacturing Company, Harrisburg.

Hazleton Iron Works, Allison, John & Co., Hazleton.

Huntingdon Car and Car Wheel Works, Huntingdon.

Jackson and Woodin Manufacturing Company, Berwick.

Johnston (Adam) & Son, Reading.

Keene, (W. H.,) Woodville.

Lebanon Manufacturing Company, Lebanon.

Lehigh Car Manufacturing Company, Stemton.

Lehigh Car Wheel and Axle Works, McKee, Fuller & Co., Catasauqua.

Lockard, (G. M. & J. K.,) Bloomsburg.

Middletown Car Works, Middletown.

Milton Car Works, Milton.

Pardee Car Works Limited, Watsontown.

Pennsylvania Car Works, Latrobe.

Schall, (M.,) York.

Snyder, (G. W.,) Pottsville.

Steele (J. D.) and Son Manufacturing Company, Pottstown.

Swissvale Car Company Limited, Swissvale.

DELAWARE—3.

Harlan (The) and Hollingsworth Company, Wilmington.

Jackson and Sharp Company, Wilmington.

Pullman's Palace Car Company, Wilmington.

VIRGINIA—2.

Roanoke Machine Works, Roanoke.

Tredegear Company, Richmond.

NORTH CAROLINA—1.

North Carolina Car Company, Raleigh.

GEORGIA—1.

Atlanta Machine Works, Atlanta.

## ALABAMA—1.

Anniston Car Company, Anniston.

## LOUISIANA—1.

L'Hote & Co., New Orleans.

## WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington.

## TENNESSEE—2.

Southern Car Works, Knoxville.

Wason Car and Foundry Company, Chattanooga.

## OHIO—5.

Barney and Smith Manufacturing Company, Dayton.

O'Ferrell (John) & Co., Piqua.

Pennock Brothers, Minerva.

United States Rolling Stock Company, Urbana. Capacity, 15 cars per day.

Youngstown Car Manufacturing Company, Youngstown.

## INDIANA—6.

Haskell and Barker Car Company, Michigan City.

Indiana Car Company, Cambridge City.

Indianapolis Car and Manufacturing Company, Indianapolis.

Lafayette Car Works, Lafayette.

Ohio Falls Car Company, Jeffersonville.

Terre Haute Car and Manufacturing Company, Terre Haute.

## ILLINOIS—6.

Corey (Francis W.) & Co., Chicago.

Jacksonville Car and Manufacturing Company, Jacksonville.

Litchfield Car and Machine Company, Litchfield.

Pullman's Palace Car Company, Pullman. Both.

United States Rolling Stock Company, Hegewisch. Capacity, 25 cars per day.

Wells, French & Co., Chicago.

## MISSOURI—4.

Brownell and Wight Car Company, St. Louis. Street cars only.

Laclede Car Manufacturing Company, St. Louis. Street cars only.

Missouri Car and Foundry Company, St. Louis.

St. Charles Car Company, St. Charles.

## MICHIGAN—5.

Iron Bay Foundry, Marquette.

Michigan Car Company, Detroit.

Peninsular Car Company, Detroit.

Pullman Car Company, Detroit.

Wallen, (H. D.,) Jr., Grand Rapids.

## CALIFORNIA—2.

Carter Brothers, San Francisco.  
Soule, (E.,) San Francisco.

## UNITED STATES.

Total number of carbuilders in the United States : 85.

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## LOCOMOTIVE WORKS.

## MAINE—1.

Portland Locomotive Works, Portland. Annual capacity, 72 locomotives.

## NEW HAMPSHIRE—1.

Manchester Locomotive Works, Manchester. Annual capacity, 144.

## MASSACHUSETTS—3.

Hinckley Locomotive Works, Boston. Annual capacity, 144.  
Mason (The) Machine Works, Taunton. Annual capacity, 72.  
Taunton Locomotive Manufacturing Company, Taunton. Annual capacity, 96.

## RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence. Annual capacity, 200.

## NEW YORK—3.

Brooks Locomotive Works, Dunkirk. Annual capacity, 200.  
New York Locomotive Works, Rome. Annual capacity, 100.  
Schenectady Locomotive Works, Schenectady. Annual capacity, 225.

## NEW JERSEY—3.

Cooke Locomotive and Machine Company, Paterson. Annual capacity, 180.  
Grant Locomotive Works, Paterson. Annual capacity, 180.  
Rogers Locomotive and Machine Works, Paterson. Annual capacity, 300.

## PENNSYLVANIA—6.

Baldwin Locomotive Works, Burnham, Parry, Williams & Co., Philadelphia. Annual capacity, 600.  
Dickson Manufacturing Company, Scranton. Annual capacity, 96.  
Hazleton Iron Works, Allison, John & Co., Hazleton. Light and mine locomotives.  
Pittsburgh Locomotive and Car Works, Pittsburgh. Annual capacity, 130.

Porter (H. K.) & Co., Pittsburgh. Light locomotives. Annual capacity, 52.

Wyoming Valley Manufacturing Company, Wilkesbarre. Light locomotives.

MARYLAND—1.

Mt. Savage Locomotive Works, Mt. Savage. Narrow gauge locomotives.

VIRGINIA—3.

Godwin (T. W.) & Co., Norfolk. Light locomotives.

Roanoke Machine Works, Roanoke.

Tanner (The) and Delaney Engine Company, Richmond. Pole railway locomotives. Annual capacity, 100.

OHIO—2.

Bucyrus Foundry and Manufacturing Company, Bucyrus. Light locomotives.

Lima Machine Works, Lima. Light weight and Shay patent locomotives. Annual capacity, 72.

CALIFORNIA—1.

Risdon Iron and Locomotive Works, San Francisco.

UNITED STATES.

Total number of locomotive works in the United States : 25.

## WROUGHT-IRON PIPE WORKS.

MASSACHUSETTS—1.

National Tube Works Company, Boston.

NEW YORK—2.

Curtis & Co., Cohoes.

Syracuse Tube Company, Syracuse.

NEW JERSEY—2.

Camden Tool and Tube Works, Camden. Owned by the Reading Iron Works, 259 South Fourth st., Philadelphia, Pa.

Cumberland Nail and Iron Company, Bridgeton. Getze & Reeves, agents, 11 and 13 North Fifth st., Philadelphia, Pa.

PENNSYLVANIA—15.

Allison Manufacturing Company, Philadelphia.

American Tube and Iron Company, Middletown. Office, 98 John st., New York City.

Byers (A. M.) & Co., Pittsburgh.



Chester Pipe and Tube Company, Chester. Office, 261 South Fourth st., Philadelphia.

Conshohocken Tube Company, Conshohocken.

Continental Tube Works Limited, Pittsburgh.

Friend (J. W.) & Co., Pittsburgh.

Hooven (James) & Son, Norristown.

Lehigh Tube and Coil Works, Albright, Son & Co., Allentown.

Morris, Tasker & Co. Limited, 222 South Third st., Philadelphia.

National Tube Works Company, McKeesport.

Pennsylvania Tube Works, Pittsburgh.

Pittsburgh Tube Company, Pittsburgh.

Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia.

Spang, Chalfant & Co., Pittsburgh.

#### DELAWARE—1.

Delaware Iron Company, New Castle. Office, 222 South Third st., Philadelphia, Pa.

#### OHIO—1.

American Tube and Iron Company, Youngstown.

#### ILLINOIS—3.

Crane Brothers Manufacturing Company, 10 North Jefferson st., Chicago.

Fieldhouse, Dutcher & Belden, 30 West Monroe st., Chicago.

Haxtun Steam Heater Company, Kewanee.

#### UNITED STATES.

Total number of wrought-iron pipe works in the United States: 25.

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## CAST-IRON PIPE WORKS.

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#### MAINE—1.

Plummer, (Charles M. & H. T.,) Portland.

#### CONNECTICUT—1.

Eaton, Cole, and Burnham Company, Bridgeport.

#### NEW JERSEY—7.

American Gas and Water Pipe Company, 98 Hudson st., Jersey City.

Gloucester Iron Works, Michellon & Sexton, Gloucester.

McNeal, (A. H.,) Burlington.

Warren Foundry, Phillipsburg.

Wood (R. D.) & Co., Millville, Camden, and Florence. Three works.

Office, 400 Chestnut st., Philadelphia, Pa.

## NEW YORK—1.

Hayes, (George B.,) 344 Exchange st., Buffalo.

## PENNSYLVANIA—8.

Carbon Iron and Pipe Company, Mauch Chunk.

Fisher, (H. H.,) Allentown.

Hazleton Iron Works, Allison, John & Co., Hazleton. Daily melting capacity, 12 tons.

Jackson and Woodin Manufacturing Company, Berwick. Daily melting capacity, 30 tons.

Mellert Foundry and Machine Company, Reading. Daily melting capacity, 75 tons.

National Foundry and Pipe Works Limited, Scottdale. Daily melting capacity, 30 tons.

Ormrod, Fisher & Co., Emaus, Lehigh county. Daily capacity, 30 tons.

Sayre Pipe Foundry, Sayre. Daily melting capacity, 30 tons.

## VIRGINIA—1.

Tredegar Company, Richmond. Daily melting capacity, 25 tons.

## TEXAS—1.

Rusk Penitentiary, State of Texas, Rusk P. O., Cherokee county.

## KENTUCKY—4.

Cincinnati and Newport Pipe Works, Newport.

Long (Dennis) & Co., Louisville. Daily melting capacity, 200 tons.

Newport Iron and Pipe Company, Newport.

Union Foundry and Pipe Works, Louisville.

## TENNESSEE—1.

Chattanooga Pipe Works, Chattanooga. Another works projected.

## OHIO—3.

Lake Shore Foundry, Cleveland. Daily melting capacity, 75 to 100 tons.

New Philadelphia Pipe Works, New Philadelphia. Daily melting capacity, 20 tons. Facilities being increased.

Ohio (The) Pipe Company, Columbus. Daily melting capacity, 75 tons.

## ILLINOIS—1.

Woodman & Warner, 226 Lake st., Chicago.

## MISSOURI—1.

Shickle, Harrison, and Howard Company, St. Louis.

## COLORADO—1.

Colorado Coal and Iron Company, South Pueblo.

## UNITED STATES.

Total number of cast-iron pipe works in the United States: 31.

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(Includes only blast furnaces, rolling mills, steel works, forges, and bloomaries.)

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## ADDENDA.

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(The information given below was received too late for insertion in its proper place in the Directory.)

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The Donaldson Iron Company has been incorporated to succeed Ormrod, Fisher & Co., lessees of the Emaus Furnace, at Emaus, Lehigh county, Pa. Philadelphia office, 226 Walnut st. (Page 11.)

The Lucinda Furnace Company has been incorporated to operate the Lucinda Furnace at Norristown, Pa. Philadelphia office, 261 South Fourth st. The product will be spiegeleisen. (Page 15.)

The Henderson Iron Company has been incorporated to operate the Henderson Furnace at Sharpsville, Pa. (Page 22.)

The Sharon Furnace, at Sharon, Pa., has been purchased by James Colford & Co., of Pittsburgh. (Page 22.)

The Calera Furnace and Charcoal Company has been organized at Montgomery, Alabama, to erect a blast furnace near Calera, in the same State.

The Bettie Furnace, at Spring Hill, West Virginia, has been leased to the Slate Creek Iron Company. (Page 41.)

The Hartsfeld Furnace Company has been organized to erect a blast furnace at Cincinnati, Ohio.

The Chicago Furnace Company has leased the Calumet Iron and Steel Company's blast furnace at Chicago. Charles Himrod & Co. are agents. (Page 55.)

The Iron River Furnace, at Iron River, Michigan, has been leased by Charles Himrod, of Chicago. (Page 58.)

The Peru Steel Ore Company has been organized at Keeseville, New York, to take control of the property recently owned by the Peru Steel and Iron Company. (Page 155.)

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