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STATISTICS

OF THE

AMERICAN AND FOREIGN IRON TRADES

FOR 1900.

ANNUAL STATISTICAL REPORT

OF THE

AMERICAN

IRON AND STEEL ASSOCIATION,

CONTAINING

COMPLETE STATISTICS OF THE IRON AND STEEL INDUSTRIES OF THE UNITED STATES FOR 1900 AND PRECEDING YEARS; ALSO STATISTICS OF THE IRON ORE, COAL, COKE, AND SHIPBUILDING INDUSTRIES OF THE UNITED STATES, AND OF IMPORTS AND EXPORTS OF IRON AND STEEL AND IRON ORE; ALSO A SUPPLEMENTARY PAPER REVIEWING THE WORLD'S IRON AND STEEL INDUSTRIES AT THE END OF THE NINETEENTH CENTURY.

PRESENTED TO THE MEMBERS, NOVEMBER 25, 1901.

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LETTER TO THE PRESIDENT.

HON. B. F. JONES,

President of The American Iron and Steel Association, Pittsburgh, Pa.

DEAR SIR: I have the honor to present herewith the Annual Statistical Report of the American Iron and Steel Association for 1900. In presenting the Report for 1899 I said that it would be the last that I would prepare. That was fully my intention and expectation, but circumstances which were wholly unexpected and which I have been unable to control have made it necessary that I should prepare one more Report. Its appearance has been delayed by the exacting character of the work that has been devoted during the whole of the present year to the revision of our Directory, which is now in press, and which we hope to be able to send to our members within a very few weeks. The Directory could have been published weeks and even months ago but for the annoying and harassing delays resulting from the frequent changes that have taken place in the ownership and description of plants and from the almost constant organization of new manufacturing companies. Never in the history of the American iron trade have so many changes in ownership occurred and so many new plants been built as in 1901, the first year of the new century.

While the present Annual Report appears much later in the year than any of its immediate predecessors the value of an early presentation of statistical information relating to the iron trade for 1900 has not been overlooked. From time to time the statistics for that year have been given in our Bulletin as fast as they were collected. The pig iron statistics for the first half of the present year have also been promptly given in the Bulletin.

The financial condition of the Association during the year 1900 is shown by the following abstract of the statement of our Treasurer, Mr. Andrew Wheeler, on December 31, 1900: On January 1, 1900, the balance in the hands of the Treasurer was $1,762.38; the receipts from members and from advertisements in the Bulletin during the year were $12,066.50; the total amount available during the year was $13,828.88; the expenditures were $11,567.93; and the balance on hand on December 31, 1900, was $2,260.95. These figures do not include the receipts from the sale of our Directory and Annual Report to brokers, commission merchants, and others who are not members of the Association, nor the payments from the fund thus derived in defraying in part the cost of the various publications of the Association.

In the collection of the statistics for this Report I have again had the aid of Mr. William G. Gray, who has been my chief statistical assistant for many years.

Very Truly Yours,

JAMES M. SWANK, *General Manager.*

No. 261 SOUTH FOURTH STREET, PHILADELPHIA, November 25, 1901.

IRON AND STEEL NECROLOGY.

FROM MAY, 1900, TO NOVEMBER, 1901.

(1900.) R. Lloyd Lee, assistant treasurer of the Phœnix Iron Company, died on May 24, at Germantown, Philadelphia. He was born at Halifax, Nova Scotia, on January 4, 1828.——Henry B. C. Nitze, one of the most promising of our mining engineers, May 25, at Rico, Colorado. He was born at Baltimore, Md., on April 19, 1867.——John Wister, president and treasurer of the Duncannon Iron Company, at Germantown, Philadelphia, June 4, in his 71st year. He died in the family homestead in which he was born.——Horace C. Disston, June 13, at Seneca Point, Charlestown, Md. He was born at Philadelphia, January 10, 1855. For several years he had been the president of Henry Disston & Sons, (incorporated.)——At Paris, France, June 15, Samuel P. Ely, aged 75 years. He was from 1858 to 1883 heavily interested in mining ventures in the Upper Peninsula of Michigan.——Edward Noah Page, of the firm of Morrison, Colwell & Page, proprietors of the rolling mill at Cohoes, N. Y., June 19, at Asbury Park, N. J., at the age of 75 years. He was born in Staffordshire, England.——Colonel Henry McCormick, a prominent ironmaster of Harrisburg, Pa., at Rosegarten, in Cumberland county, July 14. He was born at Harrisburg in 1831 and was a veteran of the civil war.——John H. Ricketson, president of the A. Garrison Foundry Company, of Pittsburgh, at Nonquitt, Mass., July 20. He was born at New Bedford, Mass., in 1837.——James Hemphill, of the firm of Mackintosh, Hemphill & Co., engine builders and machinists, of Pittsburgh, August 7, aged 73 years. He was born at Mechanicsburg, Cumberland county, Pa., on July 22, 1827.——Alexander M. Byers, one of the most prominent iron and steel manufacturers of Pittsburgh, at the Holland House, New York, September 19. He was born on the Greenfield farm, in Mercer county, Pa., on September 6, 1827.——Benjamin Crowther, at Etna, Pa., September 24, aged 74 years. He was for many years superintendent of the Isabella Furnaces, at Etna.——Watts Cooke, president of the Passaic Rolling Mill Company, of Paterson, New Jersey, September 25, at Wyckoff, New Jersey. He was born at Matteawan, Dutchess county, New York, in 1833.——Simon Seyfert, one of the most prominent ironmasters in Eastern Pennsylvania, at Gibraltar, Berks county, September 26, aged 73 years.——George F. McCleane, one of the most prominent iron manufacturers of Pittsburgh a few years ago, September 30, at Pittsburgh, in his 76th year. He was born in Delaware in 1826.——James Mosgrove, president of the Kittanning Iron and Steel Manufacturing Company, at Kittanning, Pa., November 27, aged 79 years. He was elected to Congress in 1880.——Jacob Fegely, at Pottstown, November 28, aged about 70 years. For a long time prior to the reorganization of the Warwick Iron Company he was its treasurer. He

organized the Hope Iron Company and was its president.——Samuel Potts Richards, at one time a prominent iron founder, at Camden, N. J., December 22, aged 87 years. Mr. Richards was born at Batsto, Burlington county, N. J., in 1813. He was the son of Jesse Richards, who operated the Batsto Iron Works from 1809 to 1846.

(1901.) Charles Pierre Chouteau, for many years a prominent figure in the iron trade of St. Louis, January 5, at St. Louis, at the age of 81 years. Mr. Chouteau was the grandson of Pierre Chouteau, one of the party that in 1764 founded the city of St. Louis.——Philip James, who puddled the iron for the first T-rail, at the Dowlais Iron Works, Dowlais, Glamorganshire, Wales, in 1831, at Allegheny City, January 14, aged 88 years.——William S. McManus, at Chester, Pa., January 19, aged 60 years. In 1880 he built the Chester Tube and Pipe Mills and remained at their head for many years.——Henry H. Gabel, at Pottstown, Pa., January 20, aged 93 years. In 1878 he became the head of the firm of Gabel, Jones & Gabel, which commenced the development of the iron ore mines at Boyertown, and also built Norway Furnace, at Bechtelsville, Pa.——Frederick Wilkes, at Jacksonville, Florida, January 21. Mr. Wilkes was one of the firm of Wilkeson, Wilkes & Co., which built the first furnace at Lowellville, Ohio, in 1846.——Josiah M. Bacon, at Philadelphia, February 10. Mr. Bacon was born at Torresdale in 1843. At the time of his death he was a director of the Cambria Steel Company and of other manufacturing companies.——James Moore, at Philadelphia, February 10, in his 83d year. He was born at Ban Bridge, near Belfast, Ireland, on August 7, 1818. He was one of the founders and for twenty-five years was the sole owner of the Bush Hill Iron Works, at Philadelphia.——Robert F. Kennedy, one of the directors of the Cambria Steel Company, at Philadelphia, February 22, aged about 60 years.——General Ario Pardee, Jr., eldest son of the late Ario Pardee, March 16, at Chelten Hills, Pa. He was born at Hazleton, Pa., on October 28, 1839. During the civil war he was colonel of the 147th Regiment of Pennsylvania Volunteers. He was once president of the Allentown Rolling Mills and also of the Cranberry Iron and Coal Company.——William McCullough, one of Pittsburgh's pioneer tube manufacturers, at Allegheny City, March 22, aged 80 years. He was born at Shousetown, below Pittsburgh.——Theodore A. Meysenburg, founder and former president of the Tudor Iron Works and later representative of the Republic Iron and Steel Company, at St. Louis, March 29. Colonel Meysenburg was born on July 23, 1840, in Germany. His title of colonel was earned during the civil war.——David W. Hitchcock, president of the National Tube Works Company before its absorption by the National Tube Company, at Boston, March 25, aged 70 years.——Robert S. Archer, superintendent of the Tredegar Iron Works, of Richmond, Va., at Richmond, March 30.——Charles J. Schultz, founder of the Schultz Bridge Iron Company, April 13, at Pittsburgh, aged 78 years. He was born in Germany.——Richard P. Rothwell, editor of the *Engineering and Mining Journal*, at New York, April 17. He was born at Ingersoll, Ontario, Canada, on May 1, 1837.——Philip Syng Justice, at London, England, May 5, aged 82 years.

He was born at Philadelphia. He was the head of the importing firm of Philip S. Justice & Co. About 1866, with the assistance of others, he built the Butcher Steel Works, at Nicetown, for the manufacture of steel tires.——Charles H. Ashburner, for many years president of the Abbott Iron Company, of Baltimore, and otherwise identified with the iron trade, at Baltimore, May 22.——Gilbert M. McCauley, at Philadelphia, May 25. He was treasurer and general manager of the Central Iron and Steel Company, of Harrisburg, Pa. He was born at Massillon, Ohio, about 1842.——Thomas Curtis Clarke, consulting engineer and ex-president of the American Society of Civil Engineers, at New York, June 15. Mr. Clarke was born at Newton, Mass., in 1827.——Jacob S. Rogers, at the Union League Club, New York, July 2. He was proprietor of the Rogers Locomotive Works, of Paterson, New Jersey, from 1856 until ten years ago.——Richard Heckscher, July 10, at Philadelphia. He was born at Hamburg, Germany, on August 6, 1822. He was for many years president of the Lehigh Zinc and Iron Company, of Bethlehem, and of Richard Heckscher and Sons Company, at Swedeland, Pa.——Charles Calvin Briggs, one of the board of managers of Jones & Laughlins, Limited, at Pittsburgh, July 19. Mr. Briggs was born at Auburn, Maine, on September 24, 1840.——George Matheson, at New York, in July. He was the founder of the American Tube and Iron Company, with works at Middletown, Pa., and Youngstown, Ohio, now owned by the National Tube Company. ——John Jacob Wagoner, of the pig iron commission firm of Fieser, Wagoner & Bentley, at Chicago, September 1. Mr. Wagoner was born at Cincinnati in 1848.——John D. Davis, at Oak Hill, Ohio, September 29, in his 80th year. He was a native of Wales. He was one of the original builders of Jefferson Furnace, in Jackson county, Ohio, and was its manager for 42 years.——William Rogers, October 7, at Wheeling, W. Va. He was born at Wolverhampton, England, in 1827. He was prominently identified with our sheet iron industry for more than forty years.——William P. Hopkins, general superintendent of the Slatington Rolling Mill, at Slatington, Lehigh county, Pa., October 17, aged 69 years. He was a native of Wales.——Henry Lloyd, at Pittsburgh, October 19, aged 47 years. He was born at Hollidaysburg, Pa. For many years he was actively identified with the Kensington Iron Works.——Ledlie W. Young, treasurer of the Cherry Valley Iron Company, at Pittsburgh, October 24. He was born at Pittsburgh on July 3, 1871.——James P. Kennedy, one of the organizers of and a director in the American Bridge Company, at Youngstown, Ohio, November 4. He was 39 years old.——Arthur B. Meeker, a pioneer in the iron and steel industries of Chicago and its vicinity, at Utica, N. Y., November 6. He was born at Utica on July 20, 1835.——John Graff, many years ago a member of the well known firm of Graff, Bennett & Co., iron manufacturers, at Pittsburgh, November 11, in his 80th year. He was born in Westmoreland county, Pa.——William McMillan, chairman of the executive committee of the American Car and Foundry Company, at St. Louis, November 15, aged 60 years. He was born at Hamilton, Ontario, Canada.

STATISTICS OF THE AMERICAN IRON TRADE FOR 1900.

In the accompanying tables we present detailed statistics of the production of all leading articles of iron and steel in the United States in 1900, the last year of the nineteenth century and one of the most prosperous in the history of the American iron trade. We are glad to add that this prosperity has been continued in 1901. Nor is it confined to the iron trade alone. The whole country has enjoyed a period of extraordinary prosperity since the beginning of 1899, when the boom of that year was ushered in. We also present statistics of the production and shipments of Lake Superior iron ore and the shipments of Connellsville coke in 1900; also the average monthly prices of iron and steel in 1899, 1900, and 1901; also the prices of Lake Superior iron ore in the same years; also statistics of the imports and exports of iron and steel and of iron ore by the United States in 1899 and 1900; also a table of historical value showing the production and prices of Bessemer steel rails in the United States from 1867 to 1900 and the rates of duty imposed on foreign steel rails during that period; also much other statistical information concerning our iron and steel industries and related industries in 1900 and immediately preceding years. Comparative tables of the production of iron and steel and iron ore and coal in 1899 and 1900 in all countries will be found in a supplementary paper appended to this Report, entitled "Iron and Steel at the Close of the Nineteenth Century." We present first the statistics of the raw materials of our iron and steel industries.

PRODUCTION OF IRON ORE.

Mr. John Birkinbine has compiled for the United States Geological Survey the statistics of the production of iron ore in the United States in 1899 and 1900. The total production in 1900 was 27,553,161 gross tons, against a total production in 1899 of 24,683,173 tons, showing an increase of 2,869,988 tons, which increase was almost wholly in Michigan and Minnesota. The production by States and Territories in 1899 and 1900 is given in the following table, in gross tons.

States and Territories.	1899. Gross tons.	1900. Gross tons.
Michigan	9,146,157	9,926,727
Minnesota	8,161,289	9,834,399
Alabama	2,662,943	2,759,247
Virginia and West Virginia	986,476	921,821
Pennsylvania	1,009,327	877,684
Wisconsin	579,798	746,105
Tennessee	632,046	594,171
New York	443,790	441,485
Colorado	307,557	407,084
New Jersey	256,185	344,247
Georgia and North Carolina	284,364	336,186
Montana, Nevada, New Mexico, Utah, and Wyoming	54,148	132,277
Ohio	53,221	61,016
Kentucky	35,384	52,920
Missouri	22,720	41,366
Connecticut and Massachusetts	29,611	31,185
Maryland	3,428	26,223
Texas	14,729	16,881
Iowa	.....	2,137
Total	24,683,173	27,553,161

Mr. Birkinbine also reports the production of strictly manganese ore in the United States in the last few years as follows, in gross tons: 1896, 10,088 tons; 1897, 11,108 tons; 1898, 15,957 tons; 1899, 9,935 tons; 1900, 11,771 tons. Of the total production in 1900 Virginia produced 7,881 tons and Georgia 3,447 tons; other States, 443 tons. In both 1899 and 1900 Arkansas almost wholly ceased to produce manganese ore.

IMPORTS AND EXPORTS OF IRON ORE.

The imports of iron ore into the United States in the last four years, almost entirely at the ports of Philadelphia and Baltimore, have been as follows, in gross tons, as reported by the Bureau of Statistics of the Treasury Department: 1897, 489,970 tons; 1898, 187,093 tons; 1899, 674,082 tons; 1900, 897,831 tons. Of the total imports in these four years there were received from Cuba the following quantities: 1897, 397,173 tons; 1898, 164,077 tons; 1899, 368,759 tons; 1900, 419,632 tons. We exported 40,665 tons of iron ore in 1899 and 51,460 tons in 1900.

Of the total quantity of iron ore imported from Cuba in 1900 the Juragua Iron Company Limited sent us 151,961 tons, against 161,707 tons in 1899, while the Spanish-American Iron Company sent us 292,879 tons in 1900, against 208,014 tons in 1899. In

1899 this latter company also shipped 4,200 tons of iron ore to Tyne Dock, England. The Cuban Steel Ore Company for the first time commenced to ship iron ore in the first half of 1901.

In 1897 the United States imported 135,495 gross tons of manganese ore; in 1898, 114,885 tons; in 1899, 188,349 tons; and in 1900, 256,252 tons.

SHIPMENTS OF IRON ORE FROM LEADING DISTRICTS.

The shipments of iron ore from some of the leading iron ore districts of the country in the last three years were as follows.

Shipments of iron ore from leading districts.	1898. Gross tons.	1899. Gross tons.	1900. Gross tons.
Lake Superior mines of Michigan and Wis...	8,145,765	9,853,918	9,594,038
Vermilion and Mesabi mines of Minnesota....	5,878,908	8,397,886	9,465,355
Missouri mines	90,235	71,682	88,475
Cornwall mines, Pennsylvania	584,342	763,152	558,713
New Jersey mines	269,771	300,757	339,914
Chateaugay mines, on Lake Champlain	93,576	54,534	87,592
Port Henry mines	76,100	302,470	140,767
Tilly Foster mines	.....	62,375	.....
Hudson River Ore and Iron Company	.....	21,228	4,865
Salisbury region, Connecticut	12,000	21,994	22,792
Alleghany county, Virginia	154,090	179,687	137,031
Tennessee Coal, Iron, and Railroad Company's Inman mines in Tennessee	47,282	43,492	31,586
The same company's mines in Alabama	1,219,181	1,409,744	1,376,522
Calhoun, Etowah, and Shelby counties, Ala..	92,876	127,245	154,849
Total of the above districts	16,664,126	21,610,164	22,002,499

SHIPMENTS OF LAKE SUPERIOR IRON ORE.

The *Iron Trade Review*, of Cleveland, gives complete and detailed statistics of the shipments of iron ore from the Lake Superior region in 1897, 1898, 1899, and 1900, from which we compile the following summary statement of shipments by ranges and by ports, with all-rail shipments added. The figures include shipments to furnaces in Michigan and Wisconsin.

Ranges—Gross tons.	1897.	1898.	1899.	1900.
Marquette Range	2,715,035	3,125,039	3,757,010	3,457,522
Menominee Range	1,937,013	2,522,265	3,301,052	3,261,221
Gogebic Range	2,258,236	2,498,461	2,795,856	2,875,295
Vermilion Range	1,278,481	1,265,142	1,771,502	1,655,820
Mesabi Range	4,280,873	4,613,766	6,626,384	7,809,535
Total	12,469,638	14,024,673	18,251,804	19,059,393

The Marquette range is wholly in Michigan, the Menominee and Gogebic ranges are partly in Michigan and partly in Wisconsin, and the Vermilion and Mesabi ranges are in Minnesota.

Ports—Gross tons.	1897.	1898.	1899.	1900.
Escanaba	2,302,121	2,803,513	3,729,218	3,436,734
Marquette	1,945,519	2,245,965	2,733,596	2,661,861
Ashland	2,067,637	2,391,088	2,703,447	2,633,687
Two Harbors	2,651,465	2,693,245	3,973,733	4,007,294
Gladstone	341,014	335,956	381,457	418,854
Superior	531,825	550,403	878,942	1,522,899
Duluth	2,376,064	2,635,262	3,509,965	3,888,986
All-rail	253,993	369,241	350,446	489,078
Total	12,469,638	14,024,673	18,251,804	19,059,393

The Lake Superior mines which shipped the largest quantities of iron ore in 1900 were the following: the Norrie and Pabst mines, in the Gogebic range, 905,631 tons; Tilden, in the Gogebic range, 481,909 tons; Chandler, in the Vermilion range, 644,801 tons; Minnesota, in the Vermilion range, 325,020 tons; Pioneer, in the Vermilion range, 450,794 tons; Aragon, in the Menominee range, 404,645 tons; Chapin, in the Menominee range, 929,937 tons; Pewabic, in the Menominee range, 374,043 tons; Pittsburgh and Lake Angeline, in the Marquette range, 389,128 tons; Lake Superior, in the Marquette range, 709,143 tons; Cleveland-Cliffs, in the Marquette range, 881,021 tons; Mountain Iron, in the Mesabi range, 1,001,324 tons; Fayal, in the Mesabi range, 1,252,504 tons; Mahoning, in the Mesabi range, 911,021 tons; Adams, in the Mesabi range, 777,346 tons; and Biwabik, in the Mesabi range, 924,868 tons.

Mr. Birkinbine reports that the total stocks of iron ore on hand at all United States mines on December 31, 1900, aggregated 3,709,950 tons, an increase of 1,389,672 tons over the stocks of 2,320,278 tons at the close of 1899. The greater portion of these increased stocks was held in the Lake Superior region.

RECEIPTS OF IRON ORE AT LAKE ERIE PORTS.

The *Iron Trade Review* annually publishes the statistics of the receipts of Lake Superior iron ore at Cleveland and other ports on Lake Erie, the ports of Buffalo and Erie included, the principal receipts being at Ashtabula and Cleveland; also the quantity left on the docks at the close of navigation. From these statistics we compile the following summary statement.

Years.	Receipts. Gross tons.	On dock. Gross tons.	Years.	Receipts. Gross tons.	On dock. Gross tons.
1887.....	3,439,198	1,558,861	1894.....	6,350,825	4,834,247
1888.....	3,783,659	1,848,555	1895.....	8,112,228	4,415,712
1889.....	5,856,344	2,607,106	1896.....	8,026,432	4,954,984
1890.....	6,874,664	3,893,487	1897.....	10,120,906	5,923,755
1891.....	4,939,684	3,508,489	1898.....	11,028,321	5,136,407
1892.....	6,660,734	4,149,451	1899.....	15,222,187	5,530,283
1893.....	5,333,061	4,070,710	1900.....	15,797,787	5,904,670

The receipts of Lake Superior iron ore at the ports of Buffalo, (including Tonawanda,) Erie, and Conneaut in the last seven years are given by the *Review* as follows, in gross tons.

Ports.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Buffalo....	395,339	719,742	545,101	797,446	1,075,975	1,530,016	1,616,919
Erie.....	624,438	811,989	847,849	1,311,526	1,092,364	1,309,961	1,240,715
Conneaut	237,905	244,967	327,623	495,327	1,404,169	2,320,696	2,556,631
Total.	1,257,682	1,776,698	1,720,573	2,604,299	3,572,508	5,160,673	5,414,265

PRICES OF LAKE SUPERIOR IRON ORE.

We give below the prices at which Lake Superior iron ore has been sold upon season contracts in 1899 and 1900, per gross ton, delivered at lower ports on Lake Erie; also the prices at which sales were made in the spring of 1901 for season delivery. These prices have been furnished to us by Mr. A. I. Findley, the editor of the *Iron Trade Review*, of Cleveland.

Grades.	1899.	1900.	1901.
Mesabi Bessemer.....	$2.25 @ $2.40	$4.40 @ $4.90	$2.75 @ $3.00
Mesabi non-Bessemer.....	1.90 @ 2.10	4.00 @ 4.25	2.35 @ 2.65
Marquette specular No. 1 Bessemer.	3.21 @ 3.50	5.93 @ 6.48	4.66 @ 4.92
Marquette specular No. 1 non-Bes...	2.50	5.00	3.65 @ 3.85
Chapin.....	2.73½	4.96	3.78
Soft hematites, No. 1 non-Bessemer..	2.00 @ 2.15	4.15 @ 4.25	2.85 @ 3.15
Gogebic, Marquette, and Menominee No. 1 Bessemer hematites..	2.80 @ 3.25	5.50 @ 5.75	4.25 @ 4.65
Vermilion No. 1 hard non-Bessemer	2.65	5.10	4.08
Chandler No. 1 Bessemer.....	3.35	6.00	4.62
Marquette extra low-phos. Bessemer	3.85 @ 3.90	6.80 @ 6.90	5.65 @ 5.75

The base price for 1901 of "old range" Bessemer ores, those from the Marquette, Menominee, Gogebic, and Vermilion ranges, has been fixed at $4.25, against $5.50 in 1900. The base adopted,

says Mr. Findley, is a supposititious ore containing 63 per cent. of iron, 0.045 per cent. of phosphorus, and 10 per cent. of moisture. The ore most closely approaching this analysis is the Norrie ore, of the Gogebic range. Hence it is often spoken of as the base ore. There is no agreement on prices of non-Bessemer ores for 1901, nor on Bessemer or non-Bessemer Mesabi ores.

PRODUCTION AND SHIPMENTS OF COAL AND COKE.

Mr. E. W. Parker, statistician of the United States Geological Survey, reports the production of all kinds of coal in the United States in 1900 as amounting to 240,965,917 gross tons, against 226,553,564 tons in 1899. Of the total production in 1900 51,221,353 gross tons were Pennsylvania anthracite coal and 189,744,564 tons were bituminous coal and small quantities of anthracite in New Mexico and Colorado, against 53,944,647 tons of Pennsylvania anthracite and 172,608,917 tons of bituminous in 1899. For the first time the United States produced in 1899 more coal than Great Britain, and this leadership was maintained in 1900, Great Britain's production in these two years being 220,094,781 tons in 1899 and 225,181,300 tons in 1900.

The shipments of Cumberland coal from the mines of Western Maryland and West Virginia in 1900 amounted to 5,171,916 gross tons, against 6,131,461 tons in 1899 and 5,533,636 tons in 1898.

The shipments of anthracite coal from the Pennsylvania mines in 1900 amounted to 45,107,484 gross tons, against 47,665,204 tons in 1899, a decrease in 1900 of 2,557,720 tons.

Mr. Parker also reports the total production of coke in the United States in 1900 as amounting to 20,533,348 net tons, against a total production of 19,668,569 net tons in 1899.

SHIPMENTS OF CONNELLSVILLE AND POCAHONTAS COKE.

For the following information we are indebted to Major H. P. Snyder, the editor of the Connellsville *Courier:* During the year 1900 the Connellsville coke region shipped 10,166,234 net tons of coke, for which the operators received an estimated average price of $2.70 per ton, making the value of the product at the ovens aggregate $27,448,832. This is one-third more than the amount estimated to have been received for the product of 1899, although the volume was practically the same, the output that year being 10,129,764 tons. The price of furnace coke in 1900 ranged from $2.50 to $4, and foundry coke from $2.50 to $4.25. The total number of ovens in the Connellsville region increased during the year 1900 from 19,689 to 20,954. New ovens to the

number of 1,343 were built, while 78 ovens were abandoned, making a net gain of 1,265 ovens. There has been a further increase in ovens in 1901. Furnace coke is quoted at $2.00 per net ton on cars in November, 1901.

The shipments of Pocahontas Flat Top Coke in 1900, for which we are indebted to Mr. A. J. Hemphill, secretary of the Norfolk and Western Railway Company, amounted to 1,341,444 net tons, against 1,317,246 tons in 1899 and 1,276,172 tons in 1898.

IMPORTS AND EXPORTS OF COAL AND COKE.

Our exports of anthracite coal in 1899 amounted to 1,707,796 gross tons and in 1900 to 1,654,610 tons. Our exports of bituminous coal in 1899 amounted to 4,044,354 gross tons and in 1900 to 6,262,909 tons. Our imports of coal, almost wholly bituminous, and chiefly from British North America, amounted to 1,400,522 tons in 1899 and to 1,909,276 tons in 1900. Our exports of coke in 1899 amounted to 280,196 tons and in 1900 to 376,999 tons. Our imports of coke in 1899 amounted to 37,788 tons and in 1900 to 86,565 tons. These figures are obtained from the Bureau of Statistics of the Treasury Department.

AVERAGE YEARLY PRICES OF IRON AND STEEL.

The following table gives the average yearly prices of leading articles of iron and steel in Pennsylvania for the years 1896, 1897, 1898, 1899, and 1900. These prices are obtained by averaging monthly quotations, and these have in turn been averaged from weekly quotations. The prices given are per ton of 2,240 pounds, except for bar iron, which is quoted by the 100 pounds.

Articles.	1896.	1897.	1898.	1899.	1900.
Old iron T rails, at Philadelphia.....	$14.16	$12.49	$12.39	$20.36	$19.51
No. 1 foundry pig iron, at Philadelphia	12.95	12.10	11.66	19.36	19.98
Gray forge pig iron, at Philadelphia..	11.09	10.48	10.23	16.60	16.49
Gray forge pig iron, at Pittsburgh.....	10.39	9.03	9.18	16.72	16.90
Bessemer pig iron, at Pittsburgh.....	12.14	10.13	10.33	19.03	19.49
Steel rails, at mills, in Pennsylvania..	28.00	18.75	17.62	28.12	32.29
Steel billets, at mills, at Pittsburgh..	18.83	15.08	15.31	31.12	25.06
Best bar iron, from store, at Philada...	1.40	1.31	1.28	2.07	1.96
Best bar iron, at mills, at Pittsburgh.	1.21	1.10	1.07	1.95	2.15

AVERAGE MONTHLY PRICES OF IRON AND STEEL.

In the following table we give the average monthly prices of various leading articles of iron and steel in Pennsylvania in 1899

and 1900 and in eleven months of 1901. The prices named are per gross ton of 2,240 pounds, except for bar iron, which is quoted by the 100 pounds and at Philadelphia from store. The prices of bar iron at Philadelphia have been furnished by Walter W. Cook, of Horace T. Potts & Co. Prices of No. 1 foundry pig iron are preserved for comparison with former years.

Months.	Old iron T rails, at Philadelphia.	No. 1 foundry pig iron, at Philadelphia.	Gray forge pig iron, at Philadelphia.	Gray forge pig iron, Lake ore, at Pittsburgh.	Bessemer pig iron, at Pittsburgh.	Steel rails, at mills, in Pennsylvania.	Steel billets, at mills, at Pittsburgh.	Best refined bar iron, at Philadelphia.	Best refined bar iron, at mills, at Pittsbgh.
January, 1899	$13.30	$12.12	$10.75	$9.89	$11.00	$18.50	$17.06	$1.30	$1.12
February	14.16	13.25	11.69	10.87	11.69	20.25	18.87	1.45	1.22
March	16.87	16.00	14.37	13.29	14.77	24.80	24.25	1.70	1.38
April	17.87	16.50	15.00	14.50	15.06	25.75	25.25	1.75	1.65
May	18.00	16.60	15.30	15.07	16.32	25.20	27.56	1.90	1.75
June	18.75	18.62	16.50	15.94	18.70	27.25	31.87	2.00	1.88
July	20.00	20.37	17.81	17.50	20.45	28.25	33.80	2.30	2.00
August	21.30	21.70	18.10	18.37	22.37	31.00	36.37	2.40	2.28
September	23.12	23.50	19.50	20.90	23.85	32.50	41.50	2.50	2.50
October	26.20	23.70	19.65	21.19	24.50	34.00	41.50	2.50	2.60
November	27.50	25.00	20.19	21.56	24.69	35.00	39.00	2.50	2.56
December	27.25	25.00	20.31	21.52	25.00	35.00	36.37	2.50	2.50
January, 1900	26.20	25.00	20.35	21.00	24.97	35.00	34.50	2.50	2.50
February	26.00	24.50	20.19	21.25	25.00	34.20	33.10	2.35	2.50
March	25.25	23.62	19.19	20.90	24.90	35.00	33.00	2.35	2.50
April	24.00	23.19	18.50	20.50	24.90	35.00	32.00	2.25	2.45
May	21.40	22.60	17.80	19.12	24.90	35.00	28.90	2.12	2.34
June	17.00	20.00	16.50	17.80	21.16	35.00	27.25	1.90	2.20
July	15.25	17.75	14.56	15.50	17.00	35.00	21.00	1.80	2.00
August	13.80	17.20	14.45	14.00	16.07	35.00	18.20	1.60	2.00
September	14.87	17.00	14.12	13.37	14.19	30.25	17.06	1.60	2.00
October	15.75	16.00	13.55	13.00	13.37	26.00	16.80	1.60	1.81
November	17.00	16.40	14.12	13.03	13.70	26.00	19.19	1.75	1.73
December	17.62	16.50	14.50	13.32	13.75	26.00	19.75	1.75	1.75
January, 1901	18.00	16.05	14.50	13.25	13.43	26.00	19.75	1.75	1.75
February	18.25	16.00	14.19	13.56	14.60	26.00	20.31	1.75	1.82
March	18.37	16.00	14.00	14.62	16.87	26.00	22.87	1.75	1.90
April	19.50	16.00	14.37	14.56	16.94	26.00	24.00	1.85	1.90
May	19.50	16.00	14.30	14.62	16.70	28.00	24.00	1.85	1.90
June	19.12	16.00	14.06	14.15	16.00	28.00	24.37	1.85	1.86
July	19.00	15.87	13.87	14.00	16.00	28.00	24.00	1.85	1.75
August	19.00	15.50	13.75	13.87	16.00	28.00	24.20	1.85	1.75
September	18.50	15.50	13.75	13.81	16.00	28.00	24.87	1.85	1.75
October	19.90	15.50	13.75	14.10	16.00	28.00	26.70	1.90	1.75
November 14	21.00	15.75	13.75	14.62	16.37	28.00	27.00	1.90	1.75
December	.....	.....	.....	.....	.....	.....	.....	.....	.....

AVERAGE WHOLESALE PRICES OF CUT NAILS.

The following table gives the average monthly base prices of cut nails, per keg of 100 pounds, from store at Philadelphia, since 1893, furnished by the Duncannon Iron Company.

Months.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
January.....	$1.75	$1.20	$1.00	$2.30	$1.60	$1.35	$1.40	$2.80
February...	1.75	1.20	1.00	2.30	1.55	1.35	1.65	2.80
March.....	*1.50	1.15	.95	2.45	1.55	1.30	1.75	2.80
April.....	1.50	1.10	.90	2.45	1.50	1.30	1.95	2.62
May.....	1.40	1.00	1.00	2.45	1.45	1.30	1.95	2.45
June	1.40	1.10	1.50	2.53	1.45	1.30	2.20	2.42
July.....	1.40	1.10	1.50	2.53	1.40	1.30	2.30	2.30
August.....	1.35	1.05	1.75	2.53	1.40	1.30	2.35	2.30
September..	1.35	1.05	2.20	2.53	1.45	1.30	2.60	2.25
October.....	1.30	1.00	2.30	2.53	1.45	1.30	2.75	2.28
November..	1.30	1.00	2.30	2.00	1.40	1.30	2.80	2.30
December...	1.25	.95	2.30	*1.70	1.40	1.30	2.80	2.25
Average..	$1.44	$1.08	$1.56	$2.32	$1.47	$1.31	$2.21	$2.46

*Early in 1893 the base price and schedule of extras of cut nails were changed to correspond with the wire-nail schedule, and in December, 1896, the schedule of extras was again changed to correspond with the new wire nail schedule.

AVERAGE PRICES OF WIRE NAILS AT CHICAGO.

The following table, prepared for this Report by Mr. George W. Cope, associate editor of the *Iron Age*, gives the average monthly base prices of standard sizes of wire nails, per keg of 100 pounds, in car-load lots, free on board at Chicago, from 1893 to 1900.

Months.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
January.....	$1.57	$1.17	$0.95	$2.42	$1.47	$1.55	$1.59	$3.53
February....	1.55	1.20	.95	2.42	1.45	1.57	1.73	3.53
March.....	1.65	1.15	1.00	2.57	1.50	1.55	2.09	3.53
April.....	1.65	1.00	.95	2.55	1.47	1.47	2.25	3.28
May.....	1.60	1.07	1.10	2.70	1.43	1.45	2.35	2.53
June	1.50	1.20	1.50	2.70	1.41	1.43	2.57	2.48
July.....	1.47	1.20	1.95	2.70	1.35	1.36	2.70	2.43
August.....	1.47	1.15	2.20	2.70	1.36	1.36	2.80	2.43
September..	1.47	1.10	2.40	2.70	1.49	1.43	3.06	2.35
October.....	1.40	1.05	2.40	2.70	1.54	1.46	3.17	2.35
November..	1.30	1.05	2.42	2.70	1.49	1.39	3.28	2.35
December...	1.27	1.00	2.42	*1.60	1.49	1.37	3.28	2.35
Average..	$1.49	$1.11	$1.69	$2.50	$1.45	$1.45	$2.57	$2.76

*A new nail card was adopted in December, 1896. The average price given for wire nails in December, 1896, on the new card, $1.60 per keg, would be equivalent to $1.10 per keg on the old card, showing a very great decrease in prices.

PRODUCTION OF PIG IRON.

Twenty-one States made pig iron in 1900, the same number as in 1899. The total production of pig iron in 1900 was 13,789,242 gross tons, against 13,620,703 tons in 1899, 11,773,934 tons in 1898, and 9,652,680 tons in 1897. The production in 1900 was 168,539 tons larger than in 1899. The following table gives the half-yearly production of pig iron in the last six years.

Periods.	1895. Gross tons.	1896. Gross tons.	1897. Gross tons.	1898. Gross tons.	1899. Gross tons.	1900. Gross tons.
First half....	4,087,558	4,976,236	4,403,476	5,869,703	6,289,167	7,642,569
Second half.	5,358,750	3,646,891	5,249,204	5,904,231	7,331,536	6,146,673
Total	9,446,308	8,623,127	9,652,680	11,773,934	13,620,703	13,789,242

The following table gives the half-yearly production of pig iron by States in 1900, arranged according to statistical prominence.

States—Gross tons.	First half, 1900.	Second half, 1900.	States—Gross tons.	First half, 1900.	Second half, 1900.
Pennsylvania	3,493,842	2,872,093	West Virginia....	90,358	76,400
Ohio	1,464,208	1,006,703	Michigan.....	79,262	84,450
Illinois	712,473	650,910	Missouri and Colorado.....	84,935	74,269
Alabama.....	605,977	578,360	Kentucky.....	45,757	25,805
Virginia.....	272,749	217,868	North Carolina and Georgia....	14,171	14,813
Tennessee	187,694	174,496	Connecticut.....	5,179	5,054
New York.....	193,460	99,367	Texas	7,662	2,488
Maryland	153,667	136,406	Massachusetts.....	1,554	1,756
Wisconsin and Minnesota	128,547	56,247	Total.....	7,642,569	6,146,673
New Jersey.....	101,074	69,188			

The production of pig iron in the second half of 1899 and the first half of 1900 aggregated 14,974,105 tons, or almost 15,000,000 tons. The production in the second half of 1899 was 1,042,369 tons larger than in the first half, but the production in the second half of 1900 was 1,495,896 tons less than in the first half. The large production in the second half of 1899 and the first half of 1900 was due to the extraordinary demand accompanying and following the boom of 1899, and the decline in production in the second half of 1900 was due to the subsidence of the boom.

In the first half of 1901, however, there was again an increase in the production of pig iron, the output in that period amounting to 7,674,613 tons, or many thousand tons more than in either the second half of 1899 or the first half of 1900. The present year promises to yield a total production in round num-

bers of 15,500,000 tons. We estimate the value at the furnace of the pig iron product of 1900 as amounting to $259,944,000.

The following table gives the production of pig iron by States in 1899 and 1900, in the order of their prominence in 1900.

States—Gross tons.	1899.	1900.	States—Gross tons.	1899.	1900.
Pennsylvania	6,558,878	6,365,935	West Virginia	187,858	166,758
Ohio	2,378,212	2,470,911	Michigan	134,443	163,712
Illinois	1,442,012	1,363,383	Missouri and Colorado	138,880	159,204
Alabama	1,083,905	1,184,337	Kentucky	119,019	71,562
Virginia	365,491	490,617	North Carolina and Georgia	17,835	28,984
Tennessee	346,166	362,190	Connecticut	10,129	10,233
New York	264,346	292,827	Texas	5,803	10,150
Maryland	234,477	290,073	Massachusetts	2,476	3,310
Wisconsin and Minnesota	203,175	184,794	Total	13,620,703	13,789,242
New Jersey	127,598	170,262			

All the States in the above table increased their production in 1900 except Pennsylvania, West Virginia, Kentucky, Illinois, Missouri, Wisconsin, and North Carolina.

PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

The production of pig iron in 1900, classified according to the fuel used, was as follows, compared with the four preceding years.

Fuel used—Gross tons.	1896.	1897.	1898.	1899.	1900.
Bituminous, chiefly coke	7,166,471	8,464,692	10,273,911	11,736,385	11,727,712
Anthracite and coke	1,034,745	911,628	1,180,999	1,558,521	1,636,366
Anthracite alone	111,667	21,149	22,274	41,031	40,682
Charcoal	310,244	255,211	296,750	284,766	339,874
Charcoal and coke	.....	.....	.....	.....	44,608
Total	8,623,127	9,652,680	11,773,934	13,620,703	13,789,242

The following table gives the production of bituminous pig iron by States in 1899 and 1900, according to their prominence in 1900.

States—Gross tons.	1899.	1900.	States—Gross tons.	1899.	1900.
Pennsylvania	5,134,529	4,922,374	West Virginia	187,858	166,758
Ohio	2,371,736	2,463,174	Wisconsin	161,471	131,354
Illinois	1,442,012	1,363,383	Colorado	100,553	121,155
Alabama	1,042,236	1,126,705	Kentucky	119,019	71,562
Virginia	363,943	487,838	Minnesota and Missouri	37,857	47,704
Tennessee	317,129	315,743	N. C. and Ga.	17,835	4,825
Maryland	219,236	269,589	Total	11,736,385	11,727,712
New York	220,971	235,548			
New Jersey	.....				

The table below gives the production of anthracite and mixed anthracite and bituminous pig iron by States from 1895 to 1900.

States. Gross tons.	1895.	1896.	1897.	1898.	1899.	1900.
Pennsylvania	1,151,806	1,053,772	837,081	1,102,592	1,420,618	1,440,139
New Jersey...	55,502	59,163	95,696	100,681	163,853	168,762
New York.....	63,591	33,477	.....	.....		50,859
Maryland.....	.....	.....	.....	.....	15,081	17,288
Total.....	1,270,899	1,146,412	932,777	1,203,273	1,599,552	1,677,048

The following table gives the production of charcoal pig iron by States in 1899 and 1900, according to their prominence in 1900.

States—Gross tons.	1899.	1900.	States—Gross tons.	1899.	1900.
Michigan	176,617	207,497	Ohio.....	6,476	7,737
Wisconsin			Md. and Va.....	1,708	5,975
Missouri.....			Pennsylvania....	3,731	3,422
Alabama.....	41,669	57,632	Massachusetts...	2,476	3,310
Georgia	.....	22,879	Tennessee	29,037	3,119
Connecticut.....	10,129	10,233	Kentucky.....	.....	
Texas	5,803	10,150			
New York.....	7,120	7,920	Total	284,766	339,874

There were also produced in 1900 in Georgia and Tennessee 44,608 tons of pig iron with mixed charcoal and coke.

PRODUCTION OF BESSEMER PIG IRON.

The following table gives the production of Bessemer pig iron by States in each year from 1895 to 1900, in gross tons.

States—Gross tons.	1895.	1896.	1897.	1898.	1899.	1900.
Pennsylvania.....	3,430,880	2,796,884	3,434,930	4,040,965	4,473,493	4,242,397
Ohio.....	1,031,735	799,061	1,027,897	1,570,535	1,852,965	1,898,663
Illinois.....	885,744	807,511	1,017,991	1,210,124	1,330,169	1,178,241
Maryland.....	10,916	74,628	151,105	186,563	210,670	260,688
West Virginia ...	141,968	105,275	132,907	192,699	187,858	169,802
North Carolina..	323	2,151	.....	.....	.....	
Colorado.....	55,485	40,193	6,582	88,701	96,364	118,146
Missouri.....	25,938	3,198	5,000	30,238		
Ky. and Tenn...	10,000	600	.....	.....	22,756	13,430
Wisconsin.....	16,979	21,957	15,699	14,620	14,519	21,785
Michigan.....	1,789	3,497	3,473	2,939		
Minnesota	.....	.....	.....	.....		
New Jersey.....	.....	.....	.....	.....	13,984	40,300
New York.....	11,938	.....	.....	.....	.....	
Total.....	5,623,695	4,654,955	5,795,584	7,337,384	8,202,778	7,943,452

Of the total production of Bessemer pig iron in Pennsylvania in 1900 the Lehigh Valley produced 100,777 tons; the Schuylkill Valley, 83,204 tons; the Upper Susquehanna Valley, 137,765 tons; the Lower Susquehanna Valley and the Juniata Valley, 412,446 tons; Allegheny County, 2,472,673 tons; the Shenango Valley, 633,014 tons; and the remainder of the State, 402,518 tons: total, 4,242,397 tons.

In Ohio in 1900 the Mahoning Valley produced 717,243 tons of Bessemer pig iron; the Hanging Rock bituminous district, 70,785 tons; the Lake Counties, 453,324 tons; and the remainder of the State, 657,311 tons: total, 1,898,663 tons. The Hocking Valley did not make Bessemer pig iron in 1898, 1899, or 1900.

PRODUCTION OF BASIC PIG IRON.

The production of basic pig iron in 1896 was 336,403 tons; in 1897 it was 556,391 tons; in 1898 it was 785,444 tons; in 1899 it was 985,033; and in 1900 it was 1,072,376 tons, all made with coke or mixed anthracite and coke. The production by States in the last four years was as follows, in gross tons.

States—Gross tons.	1897. Gross tons.	1898. Gross tons.	1899. Gross tons.	1900. Gross tons.
New England, N. Y., and N. J....	79,041	645	.....	4,929
Pennsylvania—Allegheny county.	265,548	378,156	470,848	446,543
Pennsylvania—other counties.....	84,520	204,547	267,760	344,065
Md., Va., Tennessee, and Alabama.	97,562	154,829	166,093	179,717
Ohio, Illinois, Wis., and Missouri.	29,720	47,267	80,332	97,122
Total.....	556,391	785,444	985,033	1,072,376

New England and Illinois did not make basic pig iron in 1900, while Tennessee did not make basic pig iron until that year.

PRODUCTION OF SPIEGELEISEN AND FERRO-MANGANESE.

The production of spiegeleisen and ferro-manganese in 1900, included in the total production of pig iron, was 255,977 tons, against 219,768 tons in 1899. The spiegeleisen and ferro-manganese produced in 1900 were made in New York, New Jersey, Pennsylvania, Maryland, Alabama, Illinois, and Colorado.

STOCKS OF UNSOLD PIG IRON.

Our statistics of stocks of unsold pig iron do not include pig iron made by the owners of rolling mills or steel works for their own use, but only pig iron made for sale and which has not been sold. The stocks of pig iron which were unsold in

the hands of manufacturers or which were under their control at the close of 1900, and were not intended for their own consumption, amounted to 442,370 tons, against 63,429 tons at the close of 1899. Included in the stocks of unsold pig iron on hand on December 31, 1900, were 12,750 tons in the yards of the American Pig Iron Storage Warrant Company which were yet under the control of the makers, the part in these yards not under their control amounting to 3,650 tons, which quantity, added to the 442,370 tons above mentioned, makes a total of 446,020 tons which were on the market at that date, against a similar total of 68,309 tons on December 31, 1899. The total stocks in the above named warrant yards on December 31, 1900, amounted to 16,400 tons, against 4,900 tons on December 31, 1899.

CONSUMPTION OF PIG IRON.

Our consumption of pig iron in the last five years is approximately shown in the following table, the comparatively small quantity of foreign pig iron held in bonded warehouses not being considered. Warrant stocks are included in stocks unsold.

Pig iron—Gross tons.	1896.	1897.	1898.	1899.	1900.
Domestic production	8,623,127	9,652,680	11,773,934	13,620,703	13,789,242
Imported	56,272	19,212	25,152	40,393	52,565
Stocks unsold January 1	506,132	847,686	874,978	415,333	68,309
Total supply	9,185,531	10,519,578	12,674,064	14,076,429	13,910,116
Deduct stocks Dec. 31	847,686	874,978	415,333	68,309	446,020
Also exports	62,071	262,686	253,057	228,678	286,687
Approximate consumption	8,275,774	9,381,914	12,005,674	13,779,442	13,177,409

Shrinkage in consumption in 1900 as compared with 1899.....602,033

NUMBER OF FURNACES IN BLAST.

The whole number of furnaces which were in blast at the close of 1900 was 232, against 289 at the close of 1899. The following table shows the number of furnaces in blast at the close of each year since 1895, classified according to the fuel used.

Fuel used.	1895.	1896.	1897.	1898.	1899.	1900.
Bituminous coal and coke	163	105	146	152	191	155
Anthracite and anth. and coke	56	32	29	30	68	45
Charcoal and charcoal and coke	23	22	16	20	30	32
Total	242	159	191	202	289	232

The number of furnaces out of blast at the close of 1900 was 174. At the close of 1899 there were 125 furnaces out of blast.

PRODUCTION OF BESSEMER STEEL.

The total production of Bessemer steel in the United States in 1900 was 6,684,770 gross tons, against 7,586,354 tons in 1899, showing a decrease in 1900 of 901,584 tons, or almost 12 per cent. The production of 1899 was the largest in our history. Of the production in 1900, 6,467 tons were steel castings, against a similar production in 1899 of 3,939 tons. The following table gives our production of Bessemer steel ingots and steel castings in the last five years, by States, including also the production by the Clapp-Griffiths, Robert-Bessemer, and Tropenas works.

States.	1896. Gross tons.	1897. Gross tons.	1898. Gross tons.	1899. Gross tons.	1900. Gross tons.
Pennsylvania	2,292,814	3,060,049	3,402,254	3,968,779	3,488,731
Ohio	568,535	1,041,541	1,489,115	1,679,237	1,388,124
Illinois	780,105	943,774	1,105,040	1,211,246	1,115,571
Other States	278,452	429,951	612,608	727,092	692,344
Total	3,919,906	5,475,315	6,609,017	7,586,354	6,684,770

There were no Clapp-Griffiths works active in 1900 and only one Robert-Bessemer plant was active. Seven Tropenas plants were at work, all employed in the production of steel castings.

No absolutely new standard Bessemer steel plants were built in 1899 or 1900, but in both years there were built a number of small Bessemer steel plants, chiefly for the production of steel castings by the Tropenas process. These plants are fully described in our Directory for 1901. In our last Annual Report it was stated that the Republic Iron and Steel Company would erect two 5-ton standard Bessemer converters at its Brown Bonnell Works at Youngstown, which converters it had acquired through the purchase of the works at Alexandria, Indiana, formerly owned by the Union Steel Company, and the works at Springfield, Illinois, formerly owned by the Springfield Iron Company. These converters were enlarged to 6-gross-tons and put in operation in September, 1900.

PRODUCTION OF OPEN-HEARTH STEEL.

The total production of open-hearth steel in the United States in 1900, including steel castings, was 3,398,135 gross tons, against 2,947,316 tons in 1899, an increase of 450,819 tons, or over 15

per cent. Our production of open-hearth steel has more than doubled in the last four years. The following table shows the production of open-hearth steel ingots and open-hearth steel castings, by States, during the past six years.

States.	1895. Gross tons.	1896. Gross tons.	1897. Gross tons.	1898. Gross tons.	1899. Gross tons.	1900. Gross tons.
New England	36,733	48,055	51,402	47,381	57,124	74,522
N. Y. and N. J.	32,203	32,120	39,521	47,957	61,461	67,361
Pennsylvania	904,352	1,009,608	1,271,751	1,817,521	2,393,811	2,699,502
Ohio	75,637	64,691	78,357	79,886	117,458	130,191
Illinois	49,500	101,832	120,609	183,103	246,183	285,551
Other States	38,757	42,394	47,031	54,444	71,279	141,008
Total	1,137,182	1,298,700	1,608,671	2,230,292	2,947,316	3,398,135

In 1900 our open-hearth steel production for the first time exceeded that of Great Britain, which amounted to 3,156,050 tons. Great Britain's production in 1900 was the largest in her history.

The open-hearth steel made in 1900 was produced by 94 works in 17 States—Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Kentucky, Tennessee, Alabama, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, and Missouri. Only 76 works and 14 States made open-hearth steel in 1899, the new States to enter the list in 1900 being Delaware, Kentucky, and Tennessee.

In 1899 the production of open-hearth steel by the basic process amounted to 2,080,426 tons and by the acid process to 866,890 tons. In 1900 2,545,091 tons were made by the basic process and 853,044 tons were made by the acid process, as follows.

States—Gross tons.	Basic open-hearth steel.	Acid open-hearth steel.	Total. Gross tons.
New England	28,550	45,972	74,522
New York and New Jersey	33,679	33,682	67,361
Pennsylvania	2,059,595	639,907	2,699,502
Ohio	76,615	53,576	130,191
Illinois	244,935	40,616	285,551
Other States	101,717	39,291	141,008
Total	2,545,091	853,044	3,398,135

PRODUCTION OF OPEN-HEARTH STEEL CASTINGS.

The total production of open-hearth steel castings in 1900, included above, amounted to 177,491 gross tons, of which 42,644 tons were made by the basic process and 134,847 tons were made

by the acid process. In 1899 the production of open-hearth steel castings amounted to 169,729 tons, of which 39,689 tons were made by the basic process and 130,040 tons by the acid process. The following table gives the production of open-hearth steel castings by the acid and basic processes in 1900, by States.

States—Gross tons.	Acid castings.	Basic castings.	Total. Gross tons.
Mass., Conn., New York, and New Jersey..	20,333	1,550	21,883
Pennsylvania.....	74,832	3,752	78,584
Ohio, Indiana, Illinois, and other States.....	39,682	37,342	77,024
Total.....	134,847	42,644	177,491

PRODUCTION OF CRUCIBLE STEEL.

The production of crucible steel in the United States in 1900 amounted to 100,562 gross tons, against 101,213 tons in 1899, 89,747 tons in 1898, 69,959 tons in 1897, 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894, and 63,613 tons in 1893. Ten States made crucible steel in 1900, namely, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Ohio, Indiana, Illinois, and Wisconsin. The direct castings produced in 1900 by the crucible process, included above, amounted to 3,989 tons. As usual Pennsylvania made about three-fourths of the country's total crucible steel production in 1900.

PRODUCTION OF MISCELLANEOUS STEEL.

The production of steel in the United States in 1900 by various minor processes amounted to 4,862 gross tons, almost all of which was in the form of direct castings, against 4,974 tons in 1899, 3,801 tons in 1898, 3,012 tons in 1897, 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892, and 4,484 tons in 1891.

TOTAL PRODUCTION OF STEEL.

The production of all kinds of steel in the United States in 1900 was as follows: Bessemer steel, 6,684,770 gross tons; open-hearth steel, 3,398,135 tons; crucible steel, 100,562 tons; all other steel, 4,862 tons: total, 10,188,329 tons, against 10,639,857 tons in 1899, a decline of 451,528 tons. Included in the figures given for 1900 are 192,803 tons of direct steel castings.

PRODUCTION OF ALL KINDS OF RAILS.

The production of Bessemer steel rails by the producers of Bessemer steel ingots in 1900 was 2,361,921 gross tons, against a

similar production in 1899 of 2,240,767 tons and 1,955,427 tons in 1898. The maximum production of Bessemer steel rails by the producers of Bessemer steel ingots was reached in 1900. The year of next largest production was 1899. In 1887, thirteen years ago, 2,044,819 tons were made. This was the third year of largest production. The following table shows the production, by States, of Bessemer steel rails by the producers of Bessemer steel ingots in the last four years.

States—Gross tons.	1897.	1898.	1899.	1900.
Pennsylvania	1,024,386	1,052,771	1,224,807	1,195,255
Other States	590,013	902,656	1,015,960	1,166,666
Total	1,614,399	1,955,427	2,240,767	2,361,921

To the above total for 1900 must be added 21,733 tons of Bessemer rails made in the same year from purchased blooms and from rerolled and renewed Bessemer rails, making a grand total for the year of 2,383,654 tons of Bessemer steel rails.

In 1900 the United States made the largest quantity of open-hearth steel rails in recent years, 1,333 tons, and the smallest quantity of iron rails ever recorded, 695 tons, which, added to the Bessemer steel rails above given, make the total production of rails in 1900 amount to 2,385,682 tons, the largest production ever attained in one year.

WEIGHT OF ALL KINDS OF RAILS.

The following table gives the production of all kinds of rails in 1900 according to the weight of the rails per yard. Included in the total production are 101,312 tons reported as street rails.

Kinds of rails—Gross tons.	Under 45 pounds.	45 pounds and less than 85.	85 pounds and over.	Total Gross tons.
Bessemer steel rails	155,950	1,625,646	602,058	2,383,654
Open-hearth steel rails	886	447	.....	1,333
Iron rails	695	.....	.....	695
Total	157,531	1,626,093	602,058	2,385,682

The total production of all kinds of rails in 1899 was 2,272,700 tons, of which 133,836 tons weighed less than 45 pounds to the yard, 1,559,340 tons weighed 45 pounds and less than 85 pounds, and 579,524 tons weighed 85 pounds and over 85 pounds. The street rails made in 1899 amounted to 154,246 tons.

PRODUCTION AND PRICES OF BESSEMER STEEL RAILS.

The following table gives the annual production in gross tons of Bessemer steel rails in the United States from 1867 to 1900, together with their average annual price at works in Pennsylvania and the rates of duty imposed on foreign steel rails.

Calendar year—Gross tons.	Production.	Price in currency.	Duty.
1867	2,277	$166.00	
1868	6,451	158.50	$45 per cent. *ad valorem* to January 1, 1871.
1869	8,616	132.25	
1870	30,357	106.75	
1871	34,152	102.50	
1872	83,991	112.00	
1873	115,192	120.50	
1874	129,414	94.25	$28 per ton from January 1, 1871, to August 1, 1872; $25.20 from August 1,1872, to March 3, 1875; $28 from March 3, 1875, to July 1, 1883.
1875	259,699	68.75	
1876	368,269	59.25	
1877	385,865	45.50	
1878	491,427	42.25	
1879	610,682	48.25	
1880	852,196	67.50	
1881	1,187,770	61.13	
1882	1,284,067	48.50	
1883	1,148,709	37.75	
1884	996,983	30.75	
1885	959,471	28.50	
1886	1,574,703	34.50	$17 per ton from July 1, 1883, to October 6, 1890.
1887	2,101,904	37.08	
1888	1,386,277	29.83	
1889	1,510,057	29.25	
1890	1,867,837	31.75	
1891	1,293,053	29.92	$13.44 from October 6, 1890, to August 28, 1894.
1892	1,537,588	30.00	
1893	1,129,400	28.12	
1894	1,016,013	24.00	
1895	1,299,628	24.33	
1896	1,116,958	28.00	
1897	1,644,520	18.75	$7.84 from August 28, 1894.
1898	1,976,702	17.62	
1899	2,270,585	28.12	
1900	2,383,654	32.29	

PRODUCTION OF IRON AND STEEL STRUCTURAL SHAPES.

Our statistics of iron and steel structural shapes embrace the production of beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but they do not include plate girders made from plates. Plates are provided for under other classifica-

tions, and under the general statistics of plates are included all plates cut to specifications. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production of strictly structural shapes in 1899 was 850,376 gross tons, and in 1900 it was 815,161 tons. The total production of structural forms in 1899 and 1900 by States was as follows.

States—Gross tons.	1899.	1900.	States—Gross tons.	1899.	1900.
New England, N. Y., and N. J....	29,604	34,242	Ohio.....	20,941	12,344
Pennsylvania.....	791,470	759,712	Colorado and California.....	8,057	8,863
Kentucky and Alabama.....	304	.....	Total.....	850,376	815,161

The decreased production of structural shapes in 1900 as compared with 1899 was 35,215 gross tons, or over 4 per cent. Pennsylvania made over 93 per cent. of the total production in 1900, New Jersey over 4 per cent., and Ohio over 1.5 per cent. No other State made 1 per cent. of the total production.

PRODUCTION OF WIRE NAILS.

The production of wire nails in the United States in 1900 amounted to 7,233,979 kegs of 100 pounds, as compared with 7,618,130 kegs in 1899, a decrease of 384,151 kegs, or 5 per cent. In 1898 the production amounted to 7,418,475 kegs, in 1897 to 8,997,245 kegs, in 1896 to 4,719,860 kegs, and in 1895 to 5,841,403 kegs. The nails produced in 1900 were manufactured by 56 works, three less than in 1899. The following table gives the production of wire nails in 1899 and 1900, by States.

States—Kegs of 100 pounds.	1899.	1900.
Massachusetts, Rhode Island, and Connecticut.....	176,877	212,584
New York and New Jersey.....	49,603	63,466
Pennsylvania.....	2,905,211	2,158,399
Maryland, West Virginia, Alabama, and Ohio.....	2,154,823	2,516,391
Indiana and Illinois.....	2,184,662	2,195,672
Michigan, Wisconsin, Kansas, Wash., and California..	146,954	87,467
Total.....	7,618,130	7,233,979

PRODUCTION OF WIRE RODS.

The production of iron and steel wire rods in the United States in 1900 amounted to 846,291 gross tons, against 1,036,398 tons in 1899 and 1,071,683 tons in 1898, showing a decrease of 190,

107 tons, or over 18 per cent., in 1900 as compared with 1899. Of the total production in 1900, 1,929 tons were iron rods and 844,362 tons were steel rods.

Pennsylvania made the largest quantity of wire rods in 1900, with Illinois second, Ohio third, and Massachusetts fourth. Six other States, Connecticut, New York, New Jersey, Kentucky, Alabama, and Indiana, also rolled wire rods in 1900.

PRODUCTION OF CUT NAILS.

Our statistics of the production of iron and steel cut nails and cut spikes do not embrace railroad and other spikes made from bar iron, wire nails of any size, or machine-made horseshoe nails. Spikes cut from plates are included with cut nails.

The total production of cut nails in 1900 was 1,573,494 kegs of 100 pounds each, against 1,904,340 kegs in 1899, a decrease of 330,846 kegs, or over 17 per cent. In 1886 the maximum production of 8,160,973 kegs was reached. In 1900 the production of wire nails exceeded the production of cut nails by 5,660,485 kegs, in 1899 by 5,713,790 kegs, in 1898 by 5,846,254 kegs, and in 1897 by 6,890,446 kegs.

Ten States made cut nails in 1900, the same number as in 1899. The following table shows the production of iron and steel cut nails by States from 1895 to 1900, in kegs of 100 pounds. The wire-nail production is added to the table.

States—Kegs.	1895.	1896.	1897.	1898.	1899.	1900.
Pennsylvania.....	938,865	646,011	1,057,964	768,171	920,133	777,611
Ohio.....	347,162	264,272	411,396	392,003	386,215	261,216
West Virginia... Indiana.....	347,022	286,210	290,203	184,942	178,006	168,469
Massachusetts and N. Jersey	161,888	137,005	142,021	127,706	149,700	155,968
Illinois.....	81,773	91,145	34,000	87,399	255,286	193,230
Maryland, Virginia, and Ky.	246,184	167,227	164,465			
Missouri, Col., Wyo., and Cal.	7,000	24,000	6,750	12,000	15,000	17,000
Total cut nails..	2,129,894	1,615,870	2,106,799	1,572,221	1,904,340	1,573,494
Total wire nails.	5,841,403	4,719,860	8,997,245	7,418,475	7,618,130	7,233,979
Grand total.	7,971,297	6,335,730	11,104,044	8,990,696	9,522,470	8,807,473

PRODUCTION OF TINPLATES.

The duty on tinplates and terne plates provided for in the tariff act of 1890 went into effect on July 1, 1891. From that

date until the close of the fiscal year ending on June 30, 1897, the statistics of our production of tinplates and terne plates were regularly collected for the Treasury Department by Colonel Ira Ayer, special agent. For the second half of 1897 and the year 1898 they were collected by the *Metal Worker*, of New York, and for 1899 and 1900 they have been collected by the American Iron and Steel Association. From the data thus obtained we have compiled the following table in gross tons of our production of tinplates and terne plates in the calendar years 1891 to 1900, the figures for 1891 being for the last six months only. The production of dipping plants is included in the figures given.

Calendar years.	Gross tons.	Calendar years.	Gross tons.
1891 (last six months)..	999	1896.....	160,362
1892.....	18,803	1897.....	256,598
1893.....	55,182	1898.....	326,915
1894.....	74,260	1899.....	360,875
1895.....	113,666	1900.....	302,665

IMPORTS OF TINPLATES.

The following table, compiled from official sources of information, gives the quantities and foreign values of the tinplates imported into the United States in the calendar years 1871 to 1900.

Years.	Gross tons.	Values.	Years.	Gross tons.	Values.
1871.....	82,969	$9,946,373	1886.....	257,822	$17,504,976
1872.....	85,629	13,893,450	1887.....	283,836	18,699,145
1873.....	97,177	14,240,868	1888.....	298,238	19,762,961
1874.....	79,778	13,057,658	1889.....	331,311	21,726,707
1875.....	91,054	12,098,885	1890.....	329,435	23,670,158
1876.....	89,946	9,416,816	1891.....	327,882	25,900,305
1877.....	112,479	10,679,028	1892.....	268,472	17,102,487
1878.....	107,864	9,069,967	1893.....	253,155	15,559,423
1879.....	154,250	13,227,659	1894.....	215,068	12,053,167
1880.....	158,049	16,478,110	1895.....	219,545	11,482,380
1881.....	183,005	14,886,907	1896.....	119,171	6,140,161
1882.....	213,987	17,975,161	1897.....	83,851	4,366,828
1883.....	221,233	18,156,773	1898.....	66,775	3,311,658
1884.....	216,181	16,858,650	1899.....	58,915	3,738,567
1885.....	228,596	15,991,152	1900.....	60,386	4,617,813

PRODUCTION OF PLATES AND SHEETS.

The production of plate and sheet iron and steel in the United States in 1900, excluding nail plate, amounted to 1,794,528 gross tons, against 1,903,505 tons in 1899. Skelp iron and steel are

not included in our statistics of plates and sheets but are classed with other rolled products.

PRODUCTION OF ALL ROLLED IRON AND STEEL.

The production of all iron and steel rolled into finished forms in the United States in 1900 was 9,487,443 gross tons, against 10,294,419 tons in 1899, a decrease of 806,976 tons, or over 7.8 per cent. It has been impossible for many years to separate rolled iron from rolled steel for statistical purposes, but the use of puddled iron in this country has been increasing in late years.

PRODUCTION OF IRON BLOOMS AND BILLETS.

The blooms and billets produced in forges directly from the ore in 1900 amounted to 4,292 gross tons, against 3,142 tons in 1899, 1,767 tons in 1898, 1,455 tons in 1897, 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, and 2,182 tons in 1892. All the ore blooms produced in 1898, 1899, and 1900 were made by the Chateaugay Ore and Iron Company, of Plattsburgh, New York, at its Standish Forge, in Clinton county.

The iron blooms produced in forges from pig and scrap iron in 1900, and which were for sale and not intended for the consumption of the makers, amounted to 8,655 gross tons, against 9,932 tons in 1899, 6,345 tons in 1898, 7,159 tons in 1897, 6,494 tons in 1896, 7,185 tons in 1895, 3,221 tons in 1894, and 6,605 tons in 1893. All the pig and scrap blooms made in forges from 1895 to 1900, and for sale, were made in Pennsylvania and Maryland.

PRODUCTION OF ALLEGHENY COUNTY, PENNSYLVANIA.

The following table gives the number of blast furnaces, rolling mills, and steel works, and the production in gross tons of pig iron and crude steel and of iron and steel rails and structural shapes in Allegheny county, Pennsylvania, in the last four years.

Details—Gross tons.	1897.	1898.	1899.	1900.
Furnaces built and building....No.	30	31	34	34
Production of pig iron.....	2,663,093	3,022,901	3,255,678	3,118,761
Rolling mills and steel works..No.	61	60	63	61
Production of Bessemer steel.....	2,061,837	2,338,087	2,606,220	2,318,871
Production of open-hearth steel.....	725,262	1,042,350	1,470,271	1,680,249
Production of crucible and other steel.....	42,231	52,352	58,426	52,188
Total production of steel.....	2,829,330	3,432,789	4,134,917	4,051,308
Production of rails.....	538,798	564,085	606,017	631,467
Production of structural shapes.....	367,702	451,323	529,979	475,572

Allegheny county produced in 1900 over 22 per cent. of the total production of pig iron in the United States; over 34 per cent. of the total production of Bessemer steel ingots and castings; over 49 per cent. of the total production of open-hearth steel ingots and castings; almost 52 per cent. of the total production of crucible steel; over 39 per cent. of the total production of all kinds of steel; over 26 per cent. of the total production of Bessemer steel rails; over 58 per cent. of the total production of structural shapes; and about 33 per cent. of all rolled products.

IMPORTS OF IRON AND STEEL.

The following table, compiled from the reports of the Bureau of Statistics of the Treasury Department, gives the quantities of various leading articles of iron and steel and of iron ore and manganese ore imported into the United States in 1899 and 1900.

Imports—Gross tons.	1899.	1900.
Pig iron, spiegeleisen, and ferro-manganese	40,393	52,565
Scrap iron and scrap steel	10,925	34,431
Bar iron	19,345	19,685
Iron and steel rails	2,134	1,448
Hoop, band, or scroll	663	165
Steel ingots, billets, blooms, etc	12,601	12,709
Sheet, plate, and taggers' iron and steel	7,043	5,143
Tinplates	58,915	60,386
Wire rods, iron or steel	17,964	21,092
Wire and wire rope	2,363	1,848
Anvils	240	223
Chains	188	260
Total iron and steel	172,774	209,955
Iron ore	674,082	897,831
Manganese ore	188,349	256,252

Our total imports of iron and steel, including machinery, cutlery, firearms, etc., for which weights are not obtainable, amounted in foreign value to $20,443,908 in 1900, against $15,800,579 in 1899, showing an increase of over 29 per cent. in 1900.

Of the pig iron imported in recent years a large part was spiegeleisen and ferro-manganese, which pay duty as pig iron.

EXPORTS OF IRON AND STEEL.

The following table gives the quantities of our exports of leading articles of iron and steel and of iron ore in 1899 and 1900, compiled from the same reports of the Bureau of Statistics.

Exports—Gross tons.	1899.	1900.
Ferro-manganese	13	32
All other pig iron	228,665	286,655
Scrap and old, for remanufacture	76,633	49,328
Bar iron	10,898	13,285
Band, hoop, or scroll iron	2,869	2,976
Bars or rods of steel not wire rods	30,429	81,366
Steel wire rods	16,992	10,652
Billets, ingots, and blooms	25,487	107,385
Cut nails and spikes	9,974	11,163
Wire nails	33,517	27,404
All other nails, including tacks	2,076	1,812
Iron plates and sheets	6,196	9,331
Steel plates and sheets	50,635	45,534
Iron rails	6,442	5,374
Steel rails	271,272	356,245
Wire	116,317	78,014
Structural iron and steel	54,244	67,714
Total iron and steel	942,659	1,154,270
Iron ore	40,665	51,460
Locomotives.....Number..	484	436

Our total exports of iron and steel, which include locomotives, car wheels, machinery, castings, hardware, saws and tools, sewing machines, stoves, printing presses, boilers, etc., amounted in 1900 to $129,633,480, against $105,690,047 in 1899, $82,771,550 in 1898, and $62,737,250 in 1897. Our exports of iron and steel more than doubled in value from 1897 to 1900.

During the early part of the year 1901 our exports of iron and steel were well maintained, but more recently there has been a decrease in our exports, caused entirely by the decline in prices abroad and by the revival of an active demand at home.

EXPORTS OF AGRICULTURAL IMPLEMENTS.

Our exports of agricultural implements, which are not included above, amounted in 1900 to $15,979,909, against $13,594,524 in 1899, $9,073,384 in 1898, and $5,302,807 in 1897. These exports increased in value more than threefold from 1897 to 1900.

STATISTICS OF IMMIGRATION.

The following statistics, for which we are indebted to the Commissioner General of Immigration of the Treasury Department, give the total number of immigrants who arrived in the United States in the calendar years 1895 to 1900, except in earlier years from the British North American Possessions and Mexico, for

which countries statistics were not collected. Immigrants to the United States who come by vessel by way of Canadian ports, and who are inspected by officers of our Government at these ports, are, however, included for late years in the figures below.

Countries.	1895.	1896.	1897.	1898.	1899.	1900.
United Kingdom	89,686	49,428	39,771	39,444	45,844	49,532
Germany	37,278	28,521	18,785	16,351	17,989	20,768
France	4,243	2,080	2,104	1,671	1,761	2,971
Austria-Hungary	50,951	53,707	31,320	50,332	84,837	108,701
Russia, including Poland	40,278	38,909	26,813	39,640	76,114	92,486
Sweden and Norway	28,147	25,506	18,692	17,365	21,970	31,844
Denmark	4,246	2,623	1,872	2,090	2,895	3,213
Netherlands	1,996	1,443	768	855	1,219	1,890
Italy	46,010	69,244	58,787	69,890	82,297	111,088
Switzerland	3,088	1,883	1,417	1,202	1,107	1,710
All other countries	18,407	27,723	22,070	16,060	25,285	47,923
Total	324,330	301,067	222,399	254,900	361,318	472,126

There was an increase of 110,808 in the total immigration of 1900 over that of 1899. Of the immigrants in 1900 an increasingly large number came from Austria-Hungary, the Russian Empire, and Italy. These countries unitedly sent us in 1900 a total of 312,275 immigrants, or nearly three-fourths of the year's immigration from all countries.

IRON AND STEEL SHIPBUILDING.

In the fiscal year ended on June 30, 1900, there were built in the United States 90 steel vessels, and in the fiscal year 1901 there were built 119 steel vessels and one iron vessel. The gross tonnage of the vessels built in the fiscal year 1900 was 196,851 tons, and the gross tonnage of the vessels built in the fiscal year 1901 was 262,699 tons. In the fiscal year 1899 there were built 91 steel vessels, with a gross tonnage of 131,379 tons, and in the fiscal year 1898 there were built 63 iron and steel vessels, with a gross tonnage of 62,266 tons. These figures show how rapid has been the growth of our shipbuilding industry in the last few years. Vessels for the United States Navy are not included in the figures here given, which have all been furnished by the Hon. Eugene T. Chamberlain, Commissioner of Navigation of the Treasury Department. The following tables, received from the Commissioner, show the number and tonnage of the steel vessels launched in the United States during the fiscal years 1900 and 1901 within the jurisdiction of the ports named.

Ports. Fiscal year 1900.	Sailing.		Steam.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
Bath, Me.	2	4,776	2	644	4	5,420
New York, N. Y.	4	4,706	10	2,510	14	7,216
Philadelphia, Pa.	.....	.....	15	11,528	15	11,528
Wilmington, Del.	.....	.....	7	14,033	7	14,033
Baltimore, Md.	.....	.....	8	13,213	8	13,213
Newport News, Va.	.....	.....	7	28,202	7	28,202
Jacksonville, Fla.	.....	.....	1	189	1	189
Cedar Keys, Fla.	.....	.....	1	229	1	229
Portland, Oregon	.....	.....	1	1,063	1	1,063
Port Townsend, Wash.	.....	.....	1	62	1	62
Sitka, Alaska	.....	.....	1	16	1	16
Buffalo, N. Y.	.....	.....	2	4,000	2	4,000
Cleveland, Ohio	.....	.....	9	42,119	9	42,119
Toledo, Ohio	.....	.....	3	5,591	3	5,591
Detroit, Mich.	.....	.....	4	15,693	4	15,693
Port Huron, Mich.	.....	.....	4	13,493	4	13,493
Marquette, Mich.	.....	.....	1	5,117	1	5,117
Grand Haven, Mich.	.....	.....	1	114	1	114
Chicago, Ill.	3	14,372	2	10,132	5	24,504
Duluth, Minn.	1	5,049	.....	.....	1	5,049
Total	10	28,903	80	167,948	90	196,851

Ports. Fiscal year 1901.	Sailing.		Steam.		Barges.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Bath, Me.	2	6,580	1	594	.....	.....	3	7,174
New York, N. Y.	.....	.....	13	6,939	1	490	14	7,429
Newark, N. J.	.....	.....	2	788	.....	.....	2	788
Philadelphia, Pa.	.....	.....	18	59,462	.....	.....	18	59,462
Wilmington, Del.	6	6,720	3	3,157	.....	.....	9	9,877
Baltimore, Md.	.....	.....	6	9,987	1	1,255	7	11,242
Richmond, Va.	.....	.....	1	24	.....	.....	1	24
Newport News, Va.	.....	.....	1	4,605	.....	.....	1	4,605
New Orleans, La.	.....	.....	1	(Iron)10	.....	.....	1	10
St. Louis, Mo.	.....	.....	1	562	2	2,324	3	2,886
St. Paul, Minn.	.....	.....	1	21	.....	.....	1	21
Buffalo, N. Y.	.....	.....	6	10,417	.....	.....	6	10,417
Cleveland, Ohio	.....	.....	14	55,261	.....	.....	14	55,261
Toledo, Ohio	.....	.....	5	7,292	.....	.....	5	7,292
Detroit, Mich.	.....	.....	6	22,090	.....	.....	6	22,090
Port Huron, Mich.	2	4,558	5	15,636	.....	.....	7	20,194
Marquette, Mich.	2	3,888	2	6,124	3	756	7	10,768
Grand Haven, Mich.	.....	.....	3	136	.....	.....	3	136
Chicago, Ill.	.....	.....	7	23,706	.....	.....	7	23,706
San Francisco, Cal.	.....	.....	4	9,040	.....	.....	4	9,040
Port Townsend, Wash.	.....	.....	1	277	.....	.....	1	277
Total	12	21,746	101	236,128	7	4,825	120	262,699

SUMMARY OF STATISTICS FOR 1899 AND 1900.

Subjects.	1899.	1900.
Production of Pig Iron, gross tons	13,620,703	13,789,242
Production of Spiegeleisen and Ferro-manganese, included in Pig Iron, gross tons	219,768	255,977
Production of Bar, Hoop, Skelp, etc., not including Wire Rods, gross tons	4,146,425	3,575,536
Production of Iron and Steel Wire Rods, gross tons.	1,036,398	846,291
Production of Iron and Steel Structural Shapes, gross tons	850,376	815,161
Production of Plate and Sheet Iron and Steel, except Nail Plate, gross tons	1,903,505	1,794,528
Production of Iron and Steel Cut Nails and Cut Spikes, kegs of 100 pounds	1,904,340	1,573,494
Production of Iron and Steel Wire Nails, kegs of 100 pounds	7,618,130	7,233,979
Production of all Rolled Iron and Steel, including Cut Nails and excluding Rails, gross tons	8,021,719	7,101,761
Production of all Rolled Iron and Steel, including both Cut Nails and Rails, gross tons	10,294,419	9,487,443
Production of Bessemer Steel Rails, gross tons	2,270,585	2,383,654
Production of Open-hearth Steel Rails, gross tons	523	1,333
Production of Iron Rails, gross tons	1,592	695
Production of all kinds of Rails, gross tons	2,272,700	2,385,682
Production of Street Rails, included above, gross tons	154,246	101,312
Production of Bessemer Steel, gross tons	7,586,354	6,684,770
Production of Open-hearth Steel Castings, gross tons	169,729	177,491
Production of all Open-hearth Steel, gross tons	2,947,316	3,398,135
Production of Crucible Steel, gross tons	101,213	100,562
Production of Blister and Patented Steel, gross tons	4,974	4,862
Production of all kinds of Steel, gross tons	10,639,857	10,188,329
Production of Ore, Pig, and Scrap Blooms for sale, gross tons	13,074	12,947
Production of Tinplates and Terne Plates, gross tons.	360,875	302,665
Value of Imports of Iron and Steel	$15,800,579	$20,443,908
Value of Exports of Iron and Steel	$105,690,047	$129,633,480
Production of Iron Ore, gross tons	24,683,173	27,553,161
Imports of Iron Ore, gross tons	674,082	897,831
Production of all kinds of Coal, gross tons	226,553,564	240,965,917
Production of Coke, net tons	19,668,569	20,533,348
Shipments of Pennsylvania Anthracite, gross tons	47,665,204	45,107,484
Imports of Coal, gross tons	1,400,522	1,909,276
Exports of Coal, gross tons	5,752,150	7,917,519
Steel Vessels built in the year ended June 30	91	90
Miles of New Railroad completed	4,512	4,157
Immigrants in the year ended December 31	361,318	472,126

PRODUCTION OF ALL KINDS OF PIG IRON IN THE UNITED STATES IN 1896, 1897, 1898, 1899, AND 1900, BY STATES.

The following Statistics, giving the total production of pig iron in the United States for the past five years, have been collected directly from the Manufacturers by The American Iron and Steel Association.

TOTAL PRODUCTION OF PIG IRON FROM 1896 TO 1900.

States.	Gross tons of 2,240 pounds.				
	1896.	1897.	1898.	1899.	1900.
Massachusetts	1,873	3,284	3,661	2,476	3,310
Connecticut	10,187	8,336	6,336	10,129	10,233
New York	206,075	243,304	228,011	264,346	292,827
New Jersey	59,163	95,696	100,681	127,598	170,262
Pennsylvania	4,024,166	4,631,634	5,537,832	6,558,878	6,365,935
Maryland	79,472	193,702	190,974	234,477	290,073
Virginia	386,277	307,610	283,274	365,491	490,617
North Carolina	2,151	.....	.....	} 17,835	28,984
Georgia	15,593	17,092	13,762		
Alabama	922,170	947,831	1,033,676	1,083,905	1,184,337
Texas	1,221	6,175	5,178	5,803	10,150
West Virginia	108,569	132,907	192,699	187,858	166,758
Kentucky	70,660	35,899	100,724	119,019	71,562
Tennessee	248,338	272,130	263,439	346,166	362,190
Ohio	1,196,326	1,372,889	1,986,358	2,378,212	2,470,911
Illinois	925,239	1,117,239	1,365,898	1,442,012	1,363,383
Michigan	149,511	132,578	147,640	134,443	163,712
Wisconsin	158,484	103,909	172,781	} 203,175	184,794
Minnesota	.....	.....	.....		
Missouri	12,548	23,883	} 141,010	138,880	159,204
Colorado	45,104	6,582			
Total	8,623,127	9,652,680	11,773,934	13,620,703	13,789,242

PRODUCTION OF ANTHRACITE AND MIXED ANTHRACITE AND BITUMINOUS PIG IRON FROM 1896 TO 1900.

States.	Gross tons of 2,240 pounds.				
	1896.	1897.	1898.	1899.	1900.
New York	33,477	.....	.....	} 163,853	{ 50,859
New Jersey	59,163	95,696	100,681		{ 168,762
Pennsylvania	1,053,772	837,081	1,102,592	1,420,618	1,440,139
Maryland	.....	.....	.....	15,081	17,288
Total	1,146,412	932,777	1,203,273	1,599,552	1,677,048

PRODUCTION OF ALL KINDS OF PIG IRON IN THE UNITED STATES.—CONTINUED.

PRODUCTION OF CHARCOAL PIG IRON FROM 1896 TO 1900.

States.	Gross tons of 2,240 pounds.				
	1896.	1897.	1898.	1899.	1900.
Massachusetts	1,873	3,284	3,661	2,476	3,310
Connecticut	10,187	8,336	6,336	10,129	10,233
New York	5,200	5,380	6,600	7,120	7,920
Pennsylvania	2,714	1,988	3,191	3,731	3,422
Maryland	4,844	4,580	2,106	1,708	5,975
Virginia	1,373	220	.....		
Georgia	14,250	17,092	13,762	.....	22,879
Alabama	29,787	14,913	36,734	41,669	57,632
Texas	1,221	6,175	5,178	5,803	10,150
Kentucky	.....	.....	.....	.....	3,119
Tennessee	27,133	24,427	17,498	29,037	
Ohio	11,426	7,807	6,351	6,476	7,737
Michigan	149,511	132,578	147,640	176,617	207,497
Wisconsin	41,375	28,431	47,693		
Missouri	9,350				
Total	310,244	255,211	296,750	284,766	339,874

In addition to the charcoal pig iron above noted there were produced in 1900 in Georgia and Tennessee 44,608 tons of pig iron with mixed charcoal and coke.

PRODUCTION OF BITUMINOUS COAL AND COKE PIG IRON FROM 1896 TO 1900.

States.	Gross tons of 2,240 pounds.				
	1896.	1897.	1898.	1899.	1900.
New York	167,398	237,924	221,411	220,971	235,548
New Jersey	.....	.....	.....	.....	
Pennsylvania	2,967,680	3,792,565	4,432,049	5,134,529	4,922,374
Maryland	74,628	189,122	188,868	219,236	269,589
Virginia	384,904	307,390	283,274	363,943	487,838
North Carolina	2,151	.....	.....	17,835	4,825
Georgia	1,343	.....	.....		
Alabama	892,383	932,918	996,942	1,042,236	1,126,705
West Virginia	108,569	132,907	192,699	187,858	166,758
Kentucky	70,660	35,899	100,724	119,019	71,562
Tennessee	221,205	247,703	245,941	317,129	315,743
Ohio	1,184,900	1,365,082	1,980,007	2,371,736	2,463,174
Illinois	925,239	1,117,239	1,365,898	1,442,012	1,363,383
Wisconsin	117,109	86,992	134,558	161,471	131,354
Minnesota					
Missouri	3,198	12,369	40,318	37,857	47,704
Colorado	45,104	6,582	91,222	100,553	121,155
Total	7,166,471	8,464,692	10,273,911	11,736,385	11,727,712

STOCKS OF ALL KINDS OF PIG IRON UNSOLD AT THE CLOSE OF 1897, 1898, 1899, AND 1900.

These statistics represent only unsold stocks in the hands of makers or their agents, including stocks controlled by the manufacturers in warrant yards, and do not include other warrant stocks, or stocks in the hands of consumers, or pig iron made for the use of the makers, or foreign pig iron held in bond.

States and Districts.	Gross tons of 2,240 pounds.			
	1897.	1898.	1899.	1900.
New England	8,103	4,339	1,199	2,791
New York	36,444	25,005	13,229	34,260
New Jersey	7,730	1,853	350	11,500
Pennsylvania. Lehigh Valley	35,952	27,949	372	41,664
Pennsylvania. Schuylkill Valley	22,301	9,926	3,851	21,895
Pennsylvania. Upper Susquehanna Valley	.....	.....	285	21,102
Pennsylvania. Lower Susquehanna Valley	19,870	26,076	8,731	
Pennsylvania. Juniata Valley	533	8,533	3,538	4,815
Pennsylvania. Allegheny County	25,743	1,246	.....	1,082
Pennsylvania. Shenango Valley	64,532	27,583	.....	22,742
Pennsylvania. Miscellaneous bituminous	32,463	100	1,287	18,003
Pennsylvania. Charcoal	7,466	7,392	4,026	3,692
Total for Pennsylvania	208,860	108,805	22,090	134,995
Maryland	2,179	2,422	.....	24,513
Virginia	70,509	18,882	6,979	
North Carolina, Georgia, and Texas	16,791	14,266	179	8,741
Alabama	56,020	27,166	7,262	49,394
Kentucky	10,546	5,545	1,302	6,673
Tennessee	25,008	24,389	3,259	15,174
Ohio. Mahoning Valley	38,148	15,070	1,712	80,792
Ohio. Hocking Valley and miscellaneous	5,905	3,041	933	9,450
Ohio. Lake Counties	9,900	.....	.....	10,761
Ohio. Hanging Rock bit. and charcoal	22,285	10,799	1,983	20,618
Total for Ohio	76,238	28,910	4,628	121,621
Indiana, Michigan, and Minnesota	109,272	24,598	2,952	32,708
Illinois and Wisconsin	12,939	5,053		
Missouri and Colorado	14,663			
Pacific States	1,187			
Grand total	656,489	291,233	63,429	442,370

STOCKS ACCORDING TO FUEL USED.

Bituminous	339,793	115,615	28,217	261,407
Anthracite and anth. and coke mixed	106,901	83,976	23,419	110,127
Charcoal	209,795	91,642	11,793	62,578
Mixed charcoal and coke	.....	.....	.....	8,258
Total	656,489	291,233	63,429	442,370

STATISTICS OF THE CANADIAN IRON TRADE FOR 1900.

GREATER progress has been made in 1900 and 1901 in the development of the iron and steel industries of Canada than in all previous years. Complete statistics for 1900 and in part for 1901 are herewith given in sufficient detail.

PRODUCTION OF PIG IRON IN CANADA.

The production of pig iron in the Dominion of Canada, as ascertained from the manufacturers by the American Iron and Steel Association, amounted in the calendar year 1900 to 86,090 gross tons, as compared with 94,077 tons in 1899, 68,755 tons in 1898, 53,796 tons in 1897, 60,030 tons in 1896, 37,829 tons in 1895, and 44,791 tons in 1894. Our statistics do not go back prior to 1894. Of the production in 1900 70,349 tons were made with coke and 15,741 tons with charcoal. The production of Bessemer pig iron in 1900, included above, amounted to 3,781 tons. Neither spiegeleisen nor ferro-manganese was made in 1900.

On December 31, 1900, the unsold stocks of pig iron in Canada amounted to 12,465 gross tons, as compared with 9,932 tons at the close of 1899 and 9,979 tons at the close of 1898. Of the unsold stocks on December 31, 1900, 6,900 tons were coke pig iron and 5,565 tons were charcoal pig iron.

On December 31, 1900, there were 10 completed furnaces in Canada and 4 furnaces were in course of construction. During 1900 one new furnace was completed at Midland, Ontario, by the Canada Iron Furnace Company, Limited. It was blown in on December 4, 1900. The other 4 furnaces referred to were all being erected by the Dominion Iron and Steel Company, Limited, at Sydney, Cape Breton, Nova Scotia. One of the furnaces was completed early in 1901 and was blown in on February 4 of that year. Two additional furnaces have since been put in blast.

The production of pig iron in Canada in the first half of 1901 amounted to 95,024 gross tons, exceeding by nearly a thousand tons the production in the whole of any preceding year. Of the total production in the first half of this year 17,577 tons were Bessemer pig iron and 13,292 tons were basic pig iron; the remainder was foundry and forge pig iron. No spiegeleisen or

ferro-manganese was made. Of the total production 86,430 tons were made with coke and 8,594 tons with charcoal. The unsold stocks on June 30, 1901, amounted to 28,711 tons, of which 21,367 tons were coke pig iron and 7,344 tons were charcoal.

PRODUCTION OF STEEL AND ALL ROLLED PRODUCTS IN CANADA.

The steel industry of Canada may be said to be to-day in a state of preparation for important results. The fulfillment of great expectations would seem, indeed, to be near at hand. Several steel-making enterprises are in a more or less forward state of completion at the present time, the most advanced of which is the open-hearth plant of the Dominion Iron and Steel Company, which is erecting at Sydney ten 50-gross-ton open-hearth furnaces of the Campbell tilting type, at which both acid and basic steel will be made. It is expected that a part of this plant will be in operation early in 1902. Its rolling-mill products will embrace blooms, slabs, billets, and rails. Early in 1900 William Kennedy & Sons, Limited, of Owen Sound, Ontario, erected at that place one 2-ton Tropenas converter for the manufacture of steel castings. Steel was first made in May, 1900.

The total production of steel in Canada in 1900 was 23,577 gross tons, against 22,000 tons in 1899, 21,540 tons in 1898, 18,400 tons in 1897, 16,000 tons in 1896, and 17,000 tons in 1895. Both Bessemer and open-hearth steel ingots and castings were made in 1899 and 1900. Of the total production of open-hearth steel in 1900 about one-third was made by the acid process.

The production of open-hearth steel rails in 1900 amounted to 700 gross tons, against 835 tons of open-hearth and iron rails in 1899; structural shapes, 4,674 tons, against 2,899 tons in 1899; cut nails made by rolling mills and steel works having cut-nail factories connected with their plants, 117,186 kegs of 100 pounds, against 235,981 kegs in 1899; plates and sheets, 2,100 tons, against about 2,220 tons in 1899; all other rolled products, excluding muck and scrap bars, blooms, billets, sheet bars, etc., 87,984 tons, against 94,153 tons in 1899. Changing the cut nail production from kegs to gross tons, the total quantity of all kinds of iron and steel rolled into finished products in the Dominion in 1900, excluding muck and scrap bars, billets, and other intermediate products, amounted to 100,690 tons, against 110,642 tons in 1899, 90,303 tons in 1898, 77,021 tons in 1897, 75,043 tons in 1896, and 66,402 tons in 1895. The number of completed rolling mills and steel works in Canada on December 31, 1900, was 18.

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IRON AND STEEL AT THE CLOSE OF THE NINETEENTH CENTURY.

By James M. Swank,

General Manager of the American Iron and Steel Association.

GENERAL REVIEW.

The progress of the world's iron and steel industries in the nineteenth century, full details of which have been presented in previous reports, is well illustrated by the statistics which show the extent of their development at the close of the century and which will presently be given. Every reader of these pages is already familiar with the fact that at the beginning of the last century comparatively little iron and steel was made in any country. There was but little demand for these products. In time railroads became, as they still are, the greatest of all the consumers of iron and steel, yet the Stockton and Darlington Railroad in England, the first railroad in the world to be built for general freight traffic and passenger travel, was not opened until 1825. The street railway dates from 1832. The general use of iron and steel for bridges and for ships and other vessels came later, followed by the general use of steel in the construction of large buildings, especially buildings of great height. Last of all we have the steel car for general freight purposes. These are the most prominent uses of iron and steel to-day, but simultaneously with the development of these leading uses there has been a constantly increasing use of agricultural machinery, textile machinery, mining machinery, electrical machinery, machine tools, iron and steel pipe, hardware, stoves, shovels, tinplates, wire, and many other articles which are made wholly or in part of iron or steel.

The railroad era began at the close of the first quarter of the nineteenth century, but it was not until the third quarter of the century was well under way that an extraordinary demand for iron and steel for railroads and for other than railroad purposes began to manifest itself in any progressive country. In our own country we built more miles of railroad in 1887 than in any

year before or since. The building of iron and steel vessels received a great deal of attention, particularly in Great Britain, in the third quarter of the century, but it was in the fourth quarter that the greatest progress was made in substituting iron and steel ships for wooden ships. As late as 1868 only five iron steamships were built in one year in this country for ocean service. We have since built over 100 steel merchant vessels in one year, and we have in recent years built a magnificent fleet for the American navy, the frames and hulls and armor being of American steel. Armor plate for war ships was not made in Great Britain until after 1850, but its manufacture was not perfected in any country until within the last ten years, while the first contract for American-made armor was not made until 1887. Iron and steel buildings date from the third quarter, but they did not receive much attention from architects and builders until the fourth quarter, while steel cars were virtually unheard of until the century was nearing its end. The manufacture of tinplates was not introduced into the United States, except experimentally, until 1890.

In a word, while the nineteenth century witnessed the development of the iron age, which was succeeded before its close by the steel age, it would be more exact to say that the last year of the first quarter of the century, when the railroad era began, witnessed only the beginning of this development, and that the last quarter has seen its ripest fruits, even the last few years of the last quarter.

The rapid growth of the world's iron and steel industries in the nineteenth century, and particularly in its last quarter, could only have been made possible by substituting improved methods of manufacture for the slow and expensive methods that were in use at its beginning. The railroads of to-day could not have been supplied with one-half of the rails they need, indeed the half of these roads would never have been built, if the invention in 1855 of the Bessemer process for making steel had not resulted in giving to the world steel rails which would last longer and could be much more cheaply and rapidly made than the rails that were made of puddled iron. Nor could the steel that is used to-day in such large quantities for various structural purposes—bridges, buildings, ships, cars, etc.—have been made at all but for the invention of the Bessemer process and its companion, the Siemens open-hearth process, the latter process dating from 1864. Nor could the pig iron that has been required by

the Bessemer and open-hearth processes have been supplied in sufficient quantities, not even the half of it, if reliance had been placed upon the small furnaces, the lean ores, and the charcoal fuel that were in common use less than a hundred years ago.

The modern blast furnace, with its immense blowing engines, its hot-blast stoves, its rich ores, and its mineral fuel to smelt them has been a most powerful factor in the present marvelous development of the world's iron and steel industries. It could not, however, have become this powerful agent if an abundance of rich iron ore and mineral fuel had not been easily obtainable. Great Britain early found at home the coke she needed for her blast furnaces; her Durham coke is not excelled anywhere; and when she began to make steel in her Bessemer converters and open-hearth furnaces she drew upon Spain and other Mediterranean countries for a large part of the ores that would make pig iron suitable for these new processes. Germany has found within the last twenty years that she could make pig iron from her phosphoric ores that could be converted into steel by the basic modification of the Bessemer process, and she has well utilized her resources. Other Continental countries have built up extensive steel industries by the Bessemer and open-hearth processes, some of them, like Great Britain, largely importing their supplies of iron ore, and some of them also importing coal and coke. There is, however, a growing scarcity of iron ore and coal in many European countries, and in some the supply is being exhausted.

In the United States nature has been lavish in her supply of all the raw materials that are needed in the manufacture of any kind of steel, except perhaps the ores of manganese. Iron ores and bituminous coal are found in many States, and anthracite coal is also found in Pennsylvania, all in generous quantities. In the second quarter of the nineteenth century we successfully introduced anthracite coal and bituminous coke in the blast furnace, and in the same period the iron ores of Lake Superior were discovered. Our Lake Superior and Cornwall ores were early found to be well adapted to the manufacture of Bessemer steel by the original process and also of open-hearth steel, and our Connellsville and Pocahontas coke are equaled in physical and chemical properties only by the Durham coke of England.

The first shipment of iron ore from the Lake Superior region was made in 1850, but it was not until 1860 that the shipments of ore from this region annually exceeded 100,000 tons. Neither Connellsville coke nor any other coke exerted any appreciable

influence upon the manufacture of pig iron in this country until after 1850. These dates show how late in the last century we began to utilize the raw materials that now have a world-wide reputation.

There is apparently no appreciable limit to the supply of rich and pure iron ores in the Lake Superior region and elsewhere in this country, and we have boundless deposits of good coking coal that are here and there being drawn upon to supplement the coal from the Connellsville basin and the Pocahontas field, neither of which favorite sources of supply will be exhausted for many years to come. Many of our rolling mills have been greatly favored with an abundant supply of natural gas, the use of this ideal fuel having commenced in 1874, at the close of the third quarter of the century under consideration. No country in the world possesses the raw materials for the manufacture of iron and steel in such abundance as the United States. And no country has developed a more skillful or more enterprising class of iron and steel makers than our own country. Our blast furnaces, our Bessemer steel works, our open-hearth furnaces, our iron and steel rolling mills, our tinplate works, and our appliances for mining and shipping iron ore and coal are the best that the world has yet seen, and they are constantly receiving the unstinted praise of our European rivals.

While great progress has been made in the last quarter of the nineteenth century in the development of the world's iron and steel industries, the most notable progress has been made in the United States. This country to-day leads all other countries in the production of iron and steel. This prominence in the manufacture of these articles is only in part due to the bounty of nature in providing liberal supplies of the raw materials needed; it is largely the result of friendly legislation by the General Government, first, in more firmly establishing in 1861 the protective tariff policy, which has since been effectively maintained with but brief interruptions, and, second, in adopting at about the same time the policy of liberal grants of land to railroad companies. Through the operation of the protective policy the home market has been preserved for the home producers of iron and steel and of all articles made from them, and through the operation of the land-grant system, supplemented by the homestead policy, thousands of miles of railroad have been built in the Western States and Territories that would not otherwise have been constructed. With the building of these roads the population of these States

and Territories has been greatly increased, the consumption of iron and steel and of other manufactured products has been enlarged, our vast mineral resources have been discovered and developed, and the whole country has been enriched. Thousands of new farms have been opened, our agricultural products have been many times multiplied, and both home and foreign markets for the sale of our surplus crops have been easily and cheaply reached.

But many of these railroads could not have been built if our protective tariff policy had not built up our iron-rail industry in the third quarter of the century and our steel-rail industry in the fourth quarter. Until we began to make our own iron rails and afterwards our own steel rails foreign manufacturers charged us excessive prices for such rails as we could afford to import. Both the industries mentioned had at the first to struggle for their very existence against foreign competition, the early duties on foreign iron rails and afterwards on foreign steel rails not being sufficiently protective, but in the end the control of the home market was gained, the production of rails increased enormously, and the prices were steadily reduced. In the meantime, as the direct result of the home competition which the protective policy had encouraged, the production of all other articles of iron and steel greatly increased and their prices were also reduced, mines of iron ore and coal were opened which would otherwise have lain dormant, and a greatly enlarged home market for all the products of the farm was created.

After all that has been said, however, of our wealth of natural resources for the production of iron and steel, and of the influence of the protective policy and the land-grant system in promoting their manufacture, the truth of history requires that it be distinctly and positively stated that all the advantages above noted would have failed to give to our country in the last quarter of the nineteenth century steel rails and steel in other forms as cheaply and abundantly as they have been supplied if these advantages had not been supplemented by the constructive and executive abilities and the persistent energy of American manufacturers and the inventive genius and technical skill of American engineers and mechanics. The courage of our iron and steel manufacturers in entering upon new enterprises of the greatest magnitude and the skill displayed by our engineers and mechanics in attaining important and valuable metallurgical results must be a constant marvel to every student of our industrial history.

Steel rails afford a good illustration of the marvelous energy and superior skill which have been displayed in the manufacture of iron and steel in our country in the last quarter of the nineteenth century. The first experimental steel rails ever made in the United States were rolled at Chicago in 1865, but our Bessemer steel industry at first made such slow progress, owing to foreign competition and the prejudice in favor of iron rails, that the whole country made only 259,699 tons of steel rails in 1875. Soon afterwards, however, American energy and skill produced most wonderful results. In 1879 we made more Bessemer steel rails than Great Britain. In 1881 we made 1,187,770 tons of steel rails and in 1887 we made 2,101,904 tons, and we have since increased these figures. Great Britain's largest production of Bessemer steel rails was in 1882, when she made 1,235,785 tons. From 1867 to 1900, both years included, we made 33,064,467 tons of Bessemer steel rails, an average of almost a million tons a year, of which 15,668,101 tons were made in the last ten years.

END OF THE CENTURY STATISTICS.

We now present a series of tables which give the most complete statistics that are now available of the production of iron and steel and iron ore and coal in all countries at the close of the nineteenth century. For the United States, Great Britain, Germany, France, and all other leading countries the statistics are virtually complete for 1900, but for other countries which produce comparatively little iron and steel and iron ore and coal we have in the main been able to present only statistics for 1899. It will be fully a year before authentic statistics for all countries for 1900 can be obtained. We add a table which shows the world's railroad mileage at the end of 1899.

Credit is due to the American Iron and Steel Association for the statistics of iron and steel production in the United States and Canada, and to the United States Geological Survey for the statistics of the production of iron ore and coal and coke in the United States. Statistics of imports and exports have been obtained from the Bureau of Statistics of the Treasury Department. Statistics for Great Britain have been compiled from the publications of the British Iron Trade Association and the blue books of the Home Office of His Majesty's Government. Statistics for Continental countries and other iron and steel statistics and coal and coke statistics have been obtained from the best available sources. For some countries official statistics may vary slightly

from those here given. The railroad table has been compiled in part from statistics recently published in the Prussian *Archiv für Eisenbahnwesen* and reduced by the New York *Railroad Gazette.*

Iron and Steel Statistics for the United States for 1899 and 1900.

Products—United States. Gross tons except where otherwise indicated.	1899.	1900.
Shipments of Lake Superior iron ore, tons	18,251,804	19,059,393
Total production of iron ore, tons	24,683,173	27,553,161
Total production of coal, tons	226,553,564	240,965,917
Exports of anthracite coal, tons	1,707,796	1,654,610
Exports of bituminous coal, tons	4,044,354	6,262,909
Shipments of Connellsville coke, net tons	10,129,764	10,166,234
Total production of coke, net tons	19,668,569	20,533,348
Production of pig iron, tons	13,620,703	13,789,242
Production of spiegeleisen and ferro-manganese, included above, tons	219,768	255,977
Production of Bessemer steel, tons	7,586,354	6,684,770
Production of Bessemer steel rails, tons	2,270,585	2,383,654
Production of all kinds of rails, tons	2,272,700	2,385,682
Production of open-hearth steel, tons	2,947,316	3,398,135
Production of crucible steel, tons	101,213	100,562
Production of miscellaneous steel, tons	4,974	4,862
Total production of steel, tons	10,639,857	10,188,329
Production of tinplates and terne plates, tons	360,875	302,665
Production of iron and steel wire rods, tons	1,036,398	846,291
Production of wire nails, kegs of 100 pounds	7,618,130	7,233,979
Production of cut nails, kegs of 100 pounds	1,904,340	1,573,494
Production of structural shapes, tons	850,376	815,161
Imports of iron and steel, tons	172,774	209,955
Exports of iron and steel, tons	942,659	1,154,270
Imports of iron and steel, foreign values	$15,800,579	$20,443,908
Exports of iron and steel, values	$105,690,047	$129,633,480
Imports of iron ore from Cuba, tons	368,759	419,632
Total imports of iron ore, tons	674,082	897,831
Exports of iron ore, tons	40,665	51,460
Imports of manganese ore, tons	188,349	256,252
Locomotives built by independent shops, No.	2,467	3,153
Locomotives built by Baldwin Locomotive Works, included above, No.	901	1,217
Pressed steel cars shipped by Pressed Steel Car Company, No.	9,624	11,831
Wooden cars with pressed steel underframes shipped by Pressed Steel Car Company, No.	None.	4,840

Iron and Steel Statistics for Continental Countries for 1899 and 1900.

Products—European Continental Countries. All in metric tons.	1899.	1900.
Production of coal and lignite in France	32,863,702	33,270,385
Production of iron ore in France	4,985,702	.....
Production of pig iron in France	2,578,401	2,699,494
Production of Bessemer steel in France	879,181	954,261
Production of open-hearth steel in France	619,845	669,787
Rroduction of miscellaneous steel in France	31,806	36,070
Production of all kinds of steel in France	1,530,832	1,660,118
Production of coal and lignite in Germany	135,844,419	149,551,058
Exports of coal from Germany	13,943,174	15,275,805
Production of iron ore in Germany and Luxemburg	17,989,635	18,964,367
Production of pig iron in Germany and Luxemburg	8,143,132	8,520,390
Production of finished steel in Germany	6,328,666	6,365,259
Production of coal in Belgium	22,072,068	23,462,817
Production of iron ore in Belgium	201,445	.....
Production of pig iron in Belgium	1,024,576	1,018,507
Production of steel ingots in Belgium	731,249	654,827
Production of coal in Spain	2,565,437	2,773,000
Production of iron ore in Spain	9,397,733	8,480,246
Production of pig iron in Spain	295,840	294,118
Production of Bessemer and open-hearth steel ingots in Spain	122,954	.....
Production of coal in Sweden	239,344	252,320
Production of iron ore in Sweden	2,435,200	2,609,500
Production of pig iron in Sweden	497,727	526,868
Production of all kinds of steel in Sweden	273,454	300,536
Production of coal and lignite in Italy	388,534	479,896
Production of iron ore in Italy	236,549	247,278
Production of pig iron in Italy	19,218	23,990
Production of steel in Italy	108,501	.....
Production of coal and lignite in Austria-Hungary	38,738,372	.....
Production of iron ore in Austria-Hungary	3,293,003	.....
Production of pig iron in Austria-Hungary	1,448,022	1,308,490
Production of steel in Austria-Hungary	1,127,104	1,145,654
Production of coal in Russia	13,558,000	16,137,736
Production of pig iron in Russia	2,664,000	2,821,000
Production of steel ingots in Russia	(?) 1,903,000	(?) 1,830,260
Production of finished steel in Russia	1,321,351	1,462,809

Iron and Steel Statistics for Great Britain for 1899 and 1900.

Products—Great Britain. All in gross tons.	1899.	1900.
Production of coal in Great Britain	220,094,781	225,181,300
Exports of coal from Great Britain	41,180,332	44,089,197
Production of iron ore in Great Britain	14,461,330	14,028,208
Imports of iron ore by Great Britain	7,054,578	6,297,963
Production of pig iron in Great Britain	9,421,435	8,959,691
Production of Bessemer steel in Great Britain	1,825,074	1,745,004
Production of Bessemer rails in Great Britain	838,148	759,844
Production of open-hearth steel in Gt. Britain	3,030,251	3,156,050
Total production of steel in Great Britain	5,000,000	5,050,000

Iron and Steel Statistics for Various Foreign Countries for 1899 and 1900.

Products—Other Countries.	1899.	1900.
Production of coal in Canada, net tons	4,925,051	5,597,832
Production of coke in Canada, net tons	100,820	157,134
Production of iron ore in Canada, net tons	74,617	122,000
Production of pig iron in Canada, gross tons	94,077	86,090
Production of steel in Canada, gross tons	22,000	23,577
Production of coal in India, gross tons	4,937,160	6,095,438
Production of iron ore in India, gross tons	60,725	63,073
Production of pig iron in India, gross tons	19,631	.....
Production of coal in New South Wales, g. t.	4,597,028	5,507,497
Production of coal in other Australasia, including New Zealand, gross tons	1,830,100	.....
Production of coal in Japan, metric tons	6,722,000	.....
Production of pig iron in Japan in 1897, m. t.	57,678	.....
Production of iron ore in Algeria, metric tons	550,941	.....

Railroad Statistics for the United States and Other Countries at the end of 1899.

Railroad Statistics.	1899.
Miles of completed railroad in the United States	189,295
Miles of completed railroad in Europe	172,621
Miles of completed railroad in Asia	35,938
Miles of completed railroad in Africa	12,501
Miles of completed railroad in Australasia	14,675
Miles of completed railroad in North America	216,290
Miles of completed railroad in South America	27,874
The world's railroad mileage at the end of 1899	479,899
Miles of new railroad built in the United States in 1899	4,512
Miles of new railroad built in the United States in 1900	4,157

COMMENTS ON THE TABLES.

Assuming that the countries that made pig iron in 1899 and which do not appear in the columns for 1900 made as much pig iron in the last year of the century as in the preceding year, and making due allowance for the production of such minor pig-iron producing countries as are not named in the tables, we have a total world's production of pig iron in 1900 of about 40,400,000 gross tons, of which the United States made 13,789,242 tons, or fully 34 per cent. Ascertaining the world's production of steel in the same way we have a total production in 1900 of about 27,200,000 gross tons, of which the United States made 10,188,329 tons, or over 37 per cent.

CHRONOLOGICAL RECORD.

We now present a chronological record of the leading events in the development of the iron and steel industries of the United States down to the close of the nineteenth century. In this record special prominence is given to the beginning of the iron industry in the original thirteen colonies and in the more important iron-producing States that were admitted into the Union after the Revolution; also to the introduction of improved processes and of the best or of newly discovered raw materials in the manufacture of iron and steel; also to the beginning of railroad building in the United States and to associated railroad events; also to early iron and steel shipbuilding and to some notable iron and steel bridges in the United States.

THE SEVENTEENTH CENTURY.

1619—In this year the Virginia Company sent to Virginia a number of persons who were skilled in the manufacture of iron to "set up three iron works" in the colony. The enterprise was undertaken in that year and the works were located on Falling creek, a tributary of the James river.

1620—In this year, as stated by Beverley in his *History of Virginia*, "an iron work at Falling creek in James river" was set up, "where they made proof of good iron oar." In this and the following year the enterprise languished. On March 22, 1622, the works were destroyed by the Indians and all the workmen were massacred. The works were not rebuilt.

1642—In this year "The Company of Undertakers for the Iron Works" in the province of Massachusetts Bay, consisting of eleven English gentlemen, was organized with a capital of £1,000.

1643—In his *History of Lynn* (1844) Alonzo Lewis says that in 1643 "Mr. John Winthrop, Jr., came from England with workmen and stock to the amount of one thousand pounds for commencing the work. A foundry was erected on the western bank of Saugus river," at Lynn, in Massachusetts. This foundry was a small blast furnace, completed in 1645. It was the first successful iron enterprise in the thirteen colonies. Bog ore was used. For a hundred years after its settlement in 1620 Massachusetts was the chief seat of the iron industry on this continent.

1645—A small iron pot, holding about a quart, which is still preserved, was cast at the Lynn foundry in 1645. It was the first iron article made from native ore in America.

1658—In 1658 Captain Thomas Clarke, in company with John Winthrop and others, put in operation an "iron worke" at New Haven, Connecticut. This enterprise embraced a blast furnace and a refinery forge.

1675—Rhode Island made iron soon after its settlement in 1636, certainly at Pawtucket and elsewhere as early as 1675, when a forge at Pawtucket, erected by Joseph Jenks, Jr., was destroyed by the Indians in the Wampanoag war, as well as other iron works and infant enterprises.

1679—In the *Statistics of Coal*, by Richard Cowling Taylor, published in 1848, it is stated that the earliest historic mention of coal in this country is by the French Jesuit missionary, Father Hennepin, who saw traces of bituminous coal on the Illinois river in 1679. In his journal he marks the site of a "cole mine" above Fort Crevecœur, near the present town of Ottawa, Illinois.

1682—In an account of the province of East Jersey, published by the proprietors in 1682, it is stated that "there is already a smelting furnace and forge set up in this colony, where is made good iron, which is of great benefit to the country." This enterprise was located at Tinton Falls, in Monmouth county, New Jersey. Other authorities definitely establish the fact that the Shrewsbury works, as they were called, were established before 1676. They were the first iron works in New Jersey.

1692—In 1692 we find the first mention of iron having been made in Pennsylvania. It is contained in a metrical composition entitled *A Short Description of Pennsylvania*, by Richard Frame, which was printed and sold by William Bradford, in Philadelphia, in 1692. Frame says that at "a certain place about some forty pound" of iron had then been made. This was doubtless an experimental enterprise.

THE EIGHTEENTH CENTURY.

1703—Abraham Lincoln's paternal ancestry was identified with the manufacture of iron in Massachusetts. The head of the American branch of his father's family, Samuel Lincoln, emigrated in 1637 from Norwich, England, to Massachusetts. Mordecai Lincoln, son of Samuel, born at Hingham on June 14, 1657, followed the trade of a blacksmith at Hull, from which place he removed to Scituate, where "he built a spacious house and was a large contributor toward the erection of the iron works at Bound Brook" in 1703. These iron works made wrought iron directly from the ore. Mordecai Lincoln had two sons, Mordecai, Jr., and Abraham, who settled in Berks county, Pennsylvania. Mordecai, Jr., was the great-great-grandfather of Abraham Lincoln.

1710—The first slitting mill in the colonies for slitting nail rods is said by tradition to have been erected at Milton, in Norfolk county, Massachusetts, as early as 1710. Nails were made by blacksmiths and others from these nail rods, sometimes on small anvils in chimney corners.

1716—After the failure of the enterprise on Falling creek no successful effort was made to revive the iron industry in Virginia until after the beginning of the succeeding century, when Governor Alexander Spotswood and his associates built a furnace in Spottsylvania county, about ten miles northwest of Fredericksburg, in 1715 or 1716. It was soon followed by other furnaces.

1716—The first iron works in Maryland were probably erected in Cecil county, at the head of Chesapeake bay. A bloomary at North East, on North East river, erected previous to 1716, probably formed the pioneer iron enterprise in this colony.

1716—Pool forge, on Manatawny creek, in Berks county, Pennsylvania, was established in 1716 by Thomas Rutter, and was the first iron enterprise in Pennsylvania of which any record has been preserved. Mrs. James, in her *Memorial of Thomas Potts, Junior*, says that Rutter was an English Quaker, who was a resident of Philadelphia in 1685.

1717—The exportation of bar iron from the American colonies began in this year, when 2 tons were sent to England from the British West India islands of Nevis and St. Christopher, but which had evidently been taken there from one of the Atlantic coast colonies.

1722—In 1722 Joseph Farmer, an ironmaster, of England, and his associates, afterwards known as the Principio Company, commenced the erection of a furnace on Talbot's manor, in Cecil

county, near the mouth of Principio creek, in Maryland, which was finished in 1724 and followed by a forge which was completed in 1725, both works being built and afterwards operated for the company by John England. This company afterwards owned many furnaces in Maryland and Virginia.

1722—Sir William Keith established on Christiana creek, in Delaware, a forge for the manufacture of bar iron. It was probably built between 1722 and 1726. It was soon followed by Abbington furnace, built about 1727.

1728—In 1728 James Logan wrote that "there are four furnaces in blast in the colony" of Pennsylvania. Colebrookdale and Durham were two of these furnaces, but the names of the others are in doubt.

1728—Scrivenor says that in 1728-29 there were imported into England from "Carolina" one ton and one cwt. of pig iron, and that in 1734 there were imported two qrs. and twelve lbs. of bar iron. These dates fix the erection of iron works in North Carolina as early as 1728, soon after which year there were many furnaces and forges in North Carolina. Hoes made in Virginia and "Carolina" were sold in New York long before the Revolution.

1728—Connecticut was probably the first of the colonies to make steel. In 1728 Samuel Higley, of Simsbury, and Joseph Dewey, of Hebron, in Hartford county, represented to the Legislature that the first-named had, "with great pains and cost, found out and obtained a curious art, by which to convert, change, or transmute common iron into good steel, sufficient for any use, and was the very first that ever performed such an operation in America." The certificates of several smiths, who had made a trial of the steel and pronounced it good, were produced. It was doubtless cementation steel.

1732—Augustine Washington, the father of George Washington, was engaged in 1732 in making pig iron at Accokeek furnace, in Stafford county, Virginia, about fifteen miles from Fredericksburg, when his famous son was born. This furnace had been built by the Principio Company, composed of English capitalists, as early as 1726, on land owned by Augustine Washington, aggregating about 1,600 acres and containing iron ore, Mr. Washington becoming the owner of one-sixth of the furnace property in consideration of the transfer of his land to the company.

1734—As early as 1734 a bloomary forge was erected at Lime Rock, in Litchfield county, Connecticut, by Thomas Lamb, which

produced from 500 to 700 pounds of iron per day. A blast furnace was afterwards added to this forge.

1735—In this year Samuel Waldo erected a furnace and foundry on the Pawtuxet river, in Rhode Island, which were afterwards known as Hope furnace.

1740—The first iron works in New York were "set up" a short time prior to 1740 on Ancram creek, in Columbia county, about fourteen miles east of the Hudson river, by Philip Livingston, the owner of the Livingston manor, and the father of Philip the signer of the Declaration of Independence.

1750—The iron industry of New Hampshire probably dates from about 1750, when several bog-ore bloomaries were in existence on Lamper Eel river but were soon discontinued. About the time of the Revolution there were a few other bloomaries in operation in New Hampshire.

1750—In 1750 it was officially reported that there was then in Massachusetts "one furnace for making steel," but its location is not given. Cementation steel was doubtless made.

1750—The Virginia coal mines were probably the first that were worked in America. Bituminous mines were opened and operated on the James river, in Chesterfield county, probably about 1750. In July, 1766, in the *Virginia Gazette*, Samuel Duval advertised coal for sale at Rockett's, a lower landing of Richmond, at 12d. per bushel, "equal to Newcastle coal."

1766—Anthracite coal was discovered in the Wyoming valley as early as 1766. It is claimed that in 1768 or 1769 two of the settlers in the valley, being two brothers named Gore, from Connecticut, who were blacksmiths, were the first persons in this country to use anthracite coal, using it in a forge fire.

1770—A rolling and slitting mill was built at Old Boonton, in Morris county, New Jersey, before the Revolution, probably about 1770, by a member of the Ogden family. A more successful enterprise of the same kind was established at Dover, in the same county, about 1792, by Israel Canfield and Jacob Losey.

1770—In this year the American colonies exported 6,017 tons of pig iron, valued at $145,628; 2,463 tons of bar iron, valued at $178,891; 2 tons of castings, valued at $158; and 8 tons of wrought iron, valued at $810.

1773—According to Dr. Ramsay the first iron works in South Carolina were erected by Mr. Buffington in 1773, but they were destroyed by the Tories during the Revolution. Other iron enterprises were undertaken in this State after the Revolution. In

the census year 1840 there were four active furnaces in South Carolina, and nine bloomaries, forges, and rolling mills. In 1856 South Carolina had eight furnaces—one in York, one in Union, and six in Spartanburg county, and in the same year the State had three small rolling mills. All these enterprises have long been abandoned.

1775—About this year a few bloomaries were erected in Maine and Vermont. A few furnaces were afterwards erected in these States and many bloomaries in Vermont. All have disappeared. Vermont was long prominent as an iron producer.

1777—Arnold's *History of the State of Rhode Island* says: "It is said that the first cold cut nail in the world was made in 1777 by Jeremiah Wilkinson, of Cumberland, Rhode Island, who died in 1832, at the advanced age of 90 years."

1790—Jacob Perkins, of Newburyport, Massachusetts, invented about 1790 his nail-cutting machine, which was patented in 1795 and speedily followed by other inventions for the same purpose.

1790—The first settlers of Tennessee erected iron works soon after the close of the Revolution. A bloomary was built in 1790 at Embreville, in Washington county, and another at Elizabethton, on Doe river, in Carter county, about 1795. Wagner's bloomary, on Roane creek, in Johnson county, was built in this year, and a bloomary was also erected on Camp creek, in Greene county, in 1797.

1791—The first iron enterprise in Kentucky was Bourbon furnace, often called Slate furnace, which was built in 1791 on Slate creek, a branch of Licking river, in Bath county, then Bourbon, and about two miles southeast of Owingsville.

1792—A small blast furnace was built in this year by George Anshutz, a native of Alsace, on Two-mile run, now Shady Side, in Pittsburgh. In 1794 it was abandoned for want of ore.

THE NINETEENTH CENTURY.

1801—About 1801 the long celebrated Champlain iron district in New York was developed, and many Catalan forges, as well as furnaces and a few rolling mills, were soon afterwards built. The forges were true Catalan forges, which converted the rich ores of the district into blooms and billets, chiefly by water-power. They were, however, of an improved type. In later years the blast was heated, which was never done with the old Catalan forge. As late as 1883 there were 27 of these forges, with 171 fires, but in 1890 there were only 14, with 102 fires. In 1900

only one forge was in existence and active—Standish Forge, in Clinton county, equipped with 18 fires and using steam-power.

1802—Catalan forges, or bloomaries, were built in Northern New Jersey long before the Revolution. Many of them were blown by the *trompe*, or water-blast. In 1795 Morse mentions "about thirty forges" in Northern New Jersey, and in 1802 a memorial to Congress says that there were then in existence 150 of these forges. There are now no Catalan forges left in New Jersey, and only two in the whole country, referred to elsewhere.

1803—The beginning of the iron industry of Ohio dates from 1803, in which year its first furnace, Hopewell, was commenced by Daniel Eaton, and in 1804 it was finished. The furnace stood on the west side of Yellow creek, about one and a quarter miles from its junction with the Mahoning river, in the township of Poland, in Mahoning county.

1807—The first railroads in the United States were built to haul gravel, stone, coal, and other heavy materials, and were all short. Strictly speaking they were tramroads and not railroads. One of these was built on Beacon Hill, in Boston, by Silas Whitney, in 1807; another by Thomas Leiper, in Delaware county, Pennsylvania, in 1809; and another at Bear Creek furnace, in Armstrong county, Pennsylvania, in 1818. The tracks of these roads were composed of wooden rails. Other short railroads for similar service soon followed, but the wooden rails were strapped with flat iron bars. Steam power was not used on any American railroad until 1829.

1810—The census statistics for 1810, published in 1814, gave the production of cast iron in the census year as 53,908 gross tons.

1810—The production of steel in 1810 was 917 tons.

1810—In the census of 1810 Tench Coxe mentions a nailery in Indiana Territory which produced in that year 20,000 pounds of nails, valued at $4,000. He does not locate this enterprise.

1810—In 1810 there was a bloomary in Warren county, a forge in Elbert county, and a nailery in Chatham county, Georgia. Two of these enterprises were near the Atlantic coast, and were doubtless among the first of their kind in the State, dating probably from about 1790.

1810—On June 27, 1810, Clemens Rentgen, a native of the Palatinate, in Germany, obtained a patent from the United States Government for "rolling iron round, for ship bolts and other uses," which invention was put to practical use at Mr. Rentgen's Pikeland works, in Chester county, Pennsylvania, in 1812 and

1813, in which years he rolled round iron, some of which was for the Navy Department at Washington. We do not learn that he ever rolled flat iron bars.

1812—The first rolling mill at Pittsburgh was built in 1811 and 1812 by Christopher Cowan, a Scotch-Irishman, and called the Pittsburgh rolling mill. This mill had no puddling furnaces. It stood at the intersection of Penn street and Cecil's alley. Its products were sheet iron, nail and spike rods, shovels, etc.

1816—Wire fences were in limited use in the neighborhood of Philadelphia as far back as 1816. The wire used was manufactured by White & Hazard at their wire works at the Falls of Schuylkill.

1816—The first rolling mill erected in the United States to puddle iron and roll flat iron bars was built by Isaac Meason in 1816 and 1817 at Plumsock, on Redstone creek, about midway between Connellsville and Brownsville, in Fayette county, Pennsylvania.

1816—The celebrated iron district in Iron and St. François counties, Missouri, which embraces Iron Mountain and Pilot Knob, appears to have contained the first iron enterprise in this State, which embraced a furnace and forge, built on Stout's creek, in Iron county, in 1815 or 1816.

1816—About 1810 Isaac Pennock built Brandywine rolling mill at Coatesville, Pennsylvania, which was purchased from him about 1816 by Dr. Charles Lukens, who had been employed at the Federal slitting mill, a neighboring enterprise. The first boiler plates made in the United States were rolled at this mill by Dr. Lukens some time prior to his death, which occurred in 1825.

1816—In his *History of Philadelphia* (1884) Thompson Westcott says that the first wire suspension bridge in the United States, if not in the world, was thrown across the Schuylkill river, near the Falls of Schuylkill, in Philadelphia, in 1816. Its use was necessarily restricted to foot passengers, and only eight passengers were allowed to be on the footway at one time.

1818—The oldest furnace in Alabama mentioned by Lesley was built about 1818 a few miles west of Russellville, in Franklin county, and abandoned in 1827. A furnace was built at Polksville, in Calhoun county, in 1843, and Shelby furnace, at Shelby, in Shelby county, was built in 1848.

1820—The production of pig iron this year is estimated by early statisticians to have amounted to only 20,000 tons, the iron industry being greatly depressed.

1825—The first bar iron made in New England was made at the Boston iron works, on the mill-dam in Boston, in 1825.

1827—On February 28, 1827, the Maryland Legislature granted a charter for the construction of the Baltimore and Ohio Railroad, which was the first railroad in the United States that was opened for the conveyance of passengers. Its construction was commenced on July 4, 1828, the venerable Charles Carroll, of Carrollton, laying the corner-stone. In 1829 the track was finished to Vinegar Hill, a distance of about 7 miles. Horse-power was at first used. The road was opened for travel from Baltimore to Ellicott's Mills, a distance of 13 miles, on May 24, 1830. The Washington branch was opened from Relay to Bladensburg on July 20, 1834, and to Washington City on August 25, 1834.

1829—The first locomotive to run upon an American railroad was the *Stourbridge Lion*. It was first used at Honesdale, in Wayne county, Pennsylvania, on Saturday, August 8, 1829, on the coal railroad of the Delaware and Hudson Canal Company. It was built in England and weighed about six tons.

1830—The production of pig iron this year was 165,000 tons.

1830—The T rail was invented in this year by Robert L. Stevens, the president and engineer of the Camden and South Amboy Railroad and Transportation Company, and T rails were made in Wales in 1830 on Mr. Stevens's order and laid down on a part of his road in 1831. The rails were rolled at the Dowlais iron works, at Dowlais, Glamorganshire.

1830—The first locomotive built in the United States and used on a railroad was the *Tom Thumb*, which was built by Peter Cooper at Baltimore and successfully experimented with on the Baltimore and Ohio Railroad in August, 1830. Mr. Cooper was his own engineer. Strictly speaking the *Tom Thumb* was only a working model, weighing less than a ton.

1830—The first American locomotive that was built for actual service was the *Best Friend of Charleston*, which was built at the West Point foundry, in New York city, for the Charleston and Hamburg Railroad and was successfully put in use on that road in December, 1830.

1830—In 1830 only 23 miles of railroad were in operation in the United States; in 1840 there were 2,818 miles; in 1850 there were 9,021 miles; in 1860 there were 30,626 miles; in 1870 there were 52,922 miles; in 1880 there were 93,262 miles; in 1890 there were 166,654 miles; and in 1900 there were 194,321 miles.

1832—Crucible steel of the best quality was first made in the United States in this year in commercial quantities at Cincinnati by Dr. William Garrard and his brother, John H. Garrard, entirely from American materials. Their works were called the Cincinnati steel works.

1832—In Brown's *History of the First Locomotives in America* it is stated that "the first charter for what are termed city passenger or horse railroads was obtained in the city of New York and known as the New York and Harlem, and this was the first road of the kind ever constructed, and was opened in 1832. No other road of the kind was completed till 1852, when the Sixth Avenue was opened to the public."

1834—The first practical application of the hot-blast to the manufacture of pig iron in this country was made at Oxford furnace, in New Jersey, in 1834, by William Henry, the manager. The waste heat at the tymp passed over the surface of a nest of small cast-iron pipes, through which the blast was conveyed to the furnace. The temperature was raised to 250° Fahrenheit. In 1835 a hot-blast oven, containing cast-iron arched pipes, was placed on the top of the stack by Mr. Henry and heated by the flame from the tunnel-head. By this means the temperature of the blast was raised to 500°. The fuel used was charcoal.

1834—Bituminous coal in Alabama was first observed in this year by Dr. Alexander Jones, of Mobile.

1835—The first puddling done in New England was at Boston, on the mill-dam, by Lyman, Ralston & Co., in 1835.

1835—The first successful use of coke in the blast furnace in the United States was accomplished by William Firmstone, at Mary Ann furnace, in Huntingdon county, Pennsylvania, in 1835.

1835—The machine-made horseshoe was patented by Henry Burden, of Troy, New York, in 1835. Other horseshoe patents were issued to him in 1843, 1857, and 1862. Mr. Burden was also the inventor of the hook-headed spike and of the Burden rotary squeezer—the latter in 1840.

1839—In 1839 a small charcoal furnace was built four miles northwest of Elizabethtown, in Hardin county, Illinois. This is the first furnace in the State of which there is any record.

1839—On October 19, 1839, Pioneer furnace, at Pottsville, Pennsylvania, built by William Lyman, of Boston, and others, under the auspices of Burd Patterson, of Pottsville, was successfully blown in with anthracite fuel by Benjamin Perry and ran for about three months, making about 28 tons of foundry iron a

week. This was the first use of anthracite fuel in the blast furnace in the United States that was attended with a fair degree of success.

1840—On July 3, 1840, the first furnace of the Lehigh Crane Iron Company, at Catasauqua, Pennsylvania, was successfully blown in by David Thomas, who had superintended its construction. Its first cast was made on July 4. From the first this furnace produced 50 tons a week of good foundry iron. Four other furnaces built by Mr. Thomas for the same company at Catasauqua soon followed the first furnace. The first furnace built and blown in by him was the first of all the early anthracite furnaces that was completely successful, both from an engineering and a commercial standpoint. Mr. Thomas is justly styled the father of our anthracite pig-iron industry.

1840—The production of pig iron this year was 286,903 tons.

1840—Indiana possessed a small charcoal-iron industry before 1840. In that year the census mentions a furnace in Jefferson county, one in Parke, one in Vigo, one in Vermilion, and three in Wayne county, the total product being 810 tons of "cast iron." A forge in Fulton county, producing 20 tons of "bar iron," is also mentioned. Bog ores were used.

1840—In 1840 the census reported that 601 tons of "cast iron" had that year been produced in 15 "furnaces" in Michigan, all in the southern part of the State. Some of these "furnaces" were undoubtedly foundries, which obtained pig iron from Ohio and other neighboring States; others used bog ores.

1840—The census of 1840 mentions a furnace in "Milwaukee town," Wisconsin, which produced three tons of iron in that year. This was probably a small foundry. In 1859 Lesley mentions three charcoal furnaces in Wisconsin.

1844—The first discovery by white men of the iron ore of the Lake Superior region was made on the 16th of September, 1844, near the eastern end of Teal lake, in Northern Michigan, by William A. Burt, a deputy surveyor of the General Government. In June, 1845, the Jackson Mining Company was organized at Jackson, Michigan, and in the same year it secured possession of the celebrated Jackson iron mountain. The ore from this mountain was first used in a bloomary at Jackson, Michigan, and afterwards, in 1847 and subsequently, in bloomaries in Northern Michigan. In 1853 a few tons of Jackson ore were shipped to the World's Fair at New York.

1844—On the 24th of April, 1844, the Hon. Edward Joy Mor-

ris, a member of Congress from Pennsylvania, declared that "not a ton of T rail had yet been made in this country."

1844—The manufacture of heavy iron rails in this country was commenced early in 1844 at the Mount Savage rolling mill, in Allegany county, Maryland, which was built in 1843 especially to roll these rails. The first rail rolled at this rolling mill, and in honor of which the Franklin Institute of Philadelphia awarded a silver medal in October, 1844, (now in the museum at Ince Blundell, Lancashire, England,) was an inverted U rail. U rails were in use in the sidings of the Cumberland and Pennsylvania Railroad as late as 1869.

1844—In this year iron rails weighing 50 pounds to the yard were rolled at the Mount Savage rolling mill, in Maryland, for the railroad leading from Fall River to Boston. These rails were T rails, and were ordered by Colonel Borden, of Fall River. They were the first T rails rolled in the United States.

1845—The Montour rolling mill, at Danville, Pennsylvania, was built in 1845 expressly to roll rails, and it is claimed that here were rolled in October of that year the first T rails made in the United States. The facts above presented give this honor to the Mount Savage rolling mill.

1845—Splint coal, or block coal, was first used in a blast furnace in the fall of 1845 by Himrod & Vincent, of Mercer county, Pennsylvania, who used it successfully in their Clay furnace.

1846—The first furnace in Ohio to use splint coal, or block coal, in its raw state, was built expressly for this purpose at Lowell, in Mahoning county, by Wilkeson, Wilkes & Co., and successfully blown in by them on the 8th of August, 1846.

1849—The production of iron rails in 1849 was 21,712 gross tons, and in 1872, the year of largest production, it was 808,866 tons. In 1900 the production had dwindled to 695 tons.

1849—A furnace was built at Georgetown, in the District of Columbia, in 1849. It went out of blast finally about 1855. A second stack was built at the same place but was never put in blast. Both were small furnaces.

1850—The production of pig iron this year was 563,755 tons.

1850—The first shipment of iron ore from the Lake Superior region was made in 1850, and consisted of about ten tons, "which was taken away by Mr. A. L. Crawford, of New Castle, Pennsylvania." A part of this ore was reduced to blooms and rolled into bar iron. It was hauled around the falls of Sault Ste. Marie on a strap railroad one and a quarter miles long.

1852—On December 10, 1852, the Pennsylvania Railroad was completed from Philadelphia to Pittsburgh.

1852—The first wire nails manufactured in the United States were made in 1851 or 1852 at New York by William Hassall. All the wire nails made by William Hassall were made from iron or brass wire and all were of small sizes, escutcheon and upholsterers' nails being specialties.

1852—David Thomas, of Catasauqua, Pennsylvania, was the first person in this country to introduce powerful blowing engines in the working of blast furnaces. About 1852 he introduced engines at his furnaces at Catasauqua which increased the pressure to double that which was then customary in England. The results were surprising.

1853—The first use of Lake Superior ore in a blast furnace occurred in Pennsylvania in 1853, when about 70 tons, brought from Erie by canal, at great expense, were used in the Sharpsville and Clay furnaces, in Mercer county. The Sharpsville furnace was the first to use the ore.

1854—Peter Cooper engaged in the manufacture of iron at Trenton, New Jersey, in 1845, where, as is stated by the *American Cyclopædia*, "he was the first to roll wrought iron beams for fire-proof buildings." These beams were rolled in the spring of 1854. They were 7 inches deep, weighed about 81 pounds per yard, and were of the form known as deck beams. They were used in Harper Brothers' and the Cooper Union buildings, New York, and also on the Camden and Amboy Railroad as rails.

1855—In this year pig iron made with anthracite coal passed that made with charcoal.

1855—The world's production of pig iron in 1855 was estimated by Abram S. Hewitt in the following year to have amounted to 7,000,000 gross tons.

1855—On March 6 the American Iron Association, now the American Iron and Steel Association, was organized at Philadelphia. In 1864 the present name was adopted.

1855—The first 30-foot rails rolled in this country are claimed to have been rolled at the Cambria iron works, at Johnstown, in 1855. There being no demand for them they were used in the tracks of the Cambria Iron Company. The first 30-foot rails rolled in this country on order were rolled at the Montour rolling mill, at Danville, in January, 1859, for the Sunbury and Erie Railroad Company.

1857—The iron industry at Chicago dates from 1857, when

Captain E. B. Ward, of Detroit, built the Chicago rolling mill, "just outside of the city." This mill was built to reroll iron rails.

1858—The first pig iron produced in the Lake Superior region was made in 1858 by Stephen R. Gay, in a small furnace on Dead river, about three miles northwest of Marquette.

1859—Clinton furnace, built in 1859 by Graff, Bennett & Co., at Pittsburgh, and blown in on the last Monday of October, was the first furnace built in Allegheny county, Pennsylvania, after the abandonment of George Anshutz's furnace at Shady Side.

1860—The production of pig iron in 1860 was 821,223 tons.

1860—The production of steel in 1860 was 11,838 tons.

1860—As late as 1860 there were about two hundred Catalan forges, or bloomaries, south of the Ohio and the Potomac rivers, which made bar iron under the hammer directly from the ore. Many of these bloomaries, some of which dated from the preceding century, were blown with the *trompe*, or water-blast, and the remainder with wooden "tubs," operated by water-power. At the close of the century only one of these bloomaries still survived, the Helton Forge of W. J. Pasley, at Crumpler, Ashe county, North Carolina, and it was not running in 1897, 1898, 1899, or 1900. The *trompe* has entirely disappeared.

1862—The Phœnix wrought-iron column, or wrought-steel column, which is now in general use in this country and in Europe in the construction of bridges, viaducts, depots, warehouses, and other structures, is the invention of the late Samuel J. Reeves, of Philadelphia, of the Phœnix Iron Company. The invention was patented on June 17, 1862.

1864—In September, 1864, William F. Durfee, acting for the Kelly Pneumatic Process Company, succeeded in making Bessemer steel at its experimental works at Wyandotte, Michigan. This was the first Bessemer steel made in the United States.

1865—The control in this country of Mr. Bessemer's steel patents was obtained in 1864 by John F. Winslow, John A. Griswold, and Alexander L. Holley, all of Troy, New York. In February, 1865, Mr. Holley was successful at Troy in producing Bessemer steel at experimental works which he had constructed for his company at that place in 1864.

1865—The first Bessemer steel rails made in the United States were rolled in May of this year at the Chicago rolling mill, in Chicago, from blooms made by William F. Durfee at Wyandotte.

1866—The first elevated city passenger railroad ever built was the Greenwich street railroad in New York, which was commenc-

ed in 1866 and has been in successful operation since 1872. It is now known as the Ninth Avenue Elevated Railway. The next project of this character was the Gilbert elevated railroad, in New York, for the construction of which a charter was granted in 1872.

1867—The first Siemens gas furnace that was regularly introduced into this country for any purpose was built by John A. Griswold & Co., at Troy, New York, and used as a heating furnace in their rolling mill, the license having been granted on the 18th of September, 1867.

1868—The first open-hearth furnace introduced into this country for the manufacture of steel by the Siemens-Martin process was built in 1868 by Frederick J. Slade for Cooper, Hewitt & Co., owners of the works of the New Jersey Steel and Iron Company, at Trenton, New Jersey.

1868—In 1867 or 1868 John Player, of England, introduced his iron hot-blast stove into the United States. Mr. Player personally superintended the erection of the first of his stoves in this country at the anthracite furnace of J. B. Moorhead & Co., at West Conshohocken, Pennsylvania.

1869—Pig iron made with raw bituminous coal and with coke passed charcoal pig iron.

1869—On May 10, 1869, the Union and Central Pacific Railroads were joined at Promontory Point, Utah Territory, making the first railroad line across the American Continent.

1869—The first successful application in this country of the Siemens regenerative gas furnace to the puddling of iron was made under the direction of William F. Durfee at the rolling mill of the American Silver Steel Company, at Bridgeport, Connecticut, in 1869.

1870—The production of pig iron in 1870 was 1,665,179 tons.

1873—The first Transatlantic iron steamships to attract attention which were built in this country were the four vessels of the American Steamship Company's line, the *Pennsylvania*, *Ohio*, *Indiana*, and *Illinois*, built of Pennsylvania iron at Philadelphia in 1871, 1872, and 1873 by W. Cramp & Sons. They were each 355 feet long and their capacity was 3,100 tons each.

1873—The first considerable importation of iron ore into this country was in 1873, when about 46,000 tons were imported, the most of which came from Canada. More than one-half of our imports came from Canada in 1873, 1874, and 1875. In 1879 we commenced to import iron ore largely from the Mediterranean countries, virtually all from Spain, Algeria, and Elba.

Before that year the imports from Canada had declined. In 1900 we imported 897,831 tons of iron ore, of which 419,632 tons came from Cuba.

1874—At the Siberian rolling mill of Rogers & Burchfield, at Leechburg, in Armstrong county, Pennsylvania, natural gas, taken from a well 1,200 feet deep, was first used in 1874 as a fuel in the manufacture of iron. For six months in this year natural gas furnished all the fuel required by this mill for puddling, heating, and making steam, not one bushel of coal having been used.

1874—The two-story bridge across the Mississippi at St. Louis was formally opened on the 4th of July of this year. It was built by the Keystone Bridge Company, of Pittsburgh, active operations having been commenced on March 19, 1868. Its centre arch is 520 feet long and there are two other arches each 502 feet long. These arches are composed of steel tubes.

1874—The Girard Avenue bridge over the Schuylkill at Philadelphia was also opened to the public on the 4th of July, 1874. It was built in fourteen months by Clarke, Reeves & Co., of Phœnixville, Pennsylvania, entirely of iron. This bridge is 1,000 feet long, 100 feet wide, and is composed of five spans. When built it was the widest bridge in the world.

1874—In 1874 John Roach & Son launched for the Pacific Mail Steamship Company, at their shipyard at Chester, Pennsylvania, two iron steamships, the *City of Peking* and the *City of Tokio*, twin vessels in all respects. These vessels were the largest and most complete iron vessels that had been built in this country down to that year. They were each 423 feet long and had a carrying capacity of 5,000 tons each.

1875—Pig iron made with bituminous fuel passed that made with anthracite.

1875—The first 60-foot rails rolled in this country were rolled by the Edgar Thomson Steel Company, at its works near Pittsburgh, in the fall of 1875, and were of steel.

1875—The Whitwell fire-brick hot-blast stove, the invention of Thomas Whitwell, of England, was first used in this country at Rising Fawn furnace, in Dade county, Georgia, on June 18, 1875. Its next application was at Cedar Point furnace, at Port Henry, in Essex county, New York, on August 12, 1875. The stoves at Cedar Point furnace were, however, built before those at Rising Fawn furnace.

1875—The first wire nails that were made of steel wire in this country were made at Covington, Kentucky, in 1875, by

Father Goebel, the pastor of St. Augustine's Catholic Church in that city, who imported a wire-nail machine from Germany. Father Goebel in the same year formed the Kentucky Wire Nail Works and ordered two more machines, he being president of the company. Thus originated the present extensive wire-nail industry of the United States.

1876—At the Centennial Exhibition at Philadelphia, in 1876, the Edgar Thomson Steel Company exhibited a steel rail which at that time was the longest steel rail that had ever been rolled. It was 120 feet long and weighed 62 pounds to the yard.

1877—The first set of Siemens-Cowper-Cochrane fire-brick hot-blast stoves erected in this country was erected at one of the Crown Point furnaces, in Essex county, New York, in 1877; but the first set of these stoves in any part of America was erected at Londonderry, in Nova Scotia, by the Steel Company of Canada Limited, in 1876. The Siemens-Cowper-Cochrane stove is an English invention.

1878—The world's production of pig iron in 1878 was estimated in 1879 by the compiler of this chronological record to have amounted to 14,262,174 tons, and the world's production of steel in the same year was estimated by the same authority to have amounted to 2,941,775 tons.

1880—The production of pig iron in 1880 was 3,835,191 tons.

1880—The first elevated railroad constructed in this country in connection with a regular freight and passenger railroad was undertaken by the Pennsylvania Railroad Company in 1880 and finished in 1881. It constitutes an extension of the main line of the Pennsylvania Railroad to the heart of the city of Philadelphia and is about a mile long. It was opened for freight purposes on April 25, 1881, and for passengers on December 5, 1881. The elevated railroad into Jersey City for the Pennsylvania Railroad Company was opened for service on May 17, 1891.

1883—The celebrated steel suspension bridge over the East river, connecting New York with Brooklyn, was projected in 1865 but its construction was not actually undertaken until 1869. Its engineer was John A. Roebling, who died in this year, being succeeded by his son, Washington A. Roebling. The bridge was completed and formally opened on May 24, 1883. The total length of the bridge and approaches is 5,989 feet. The length of the main span is 1,595 feet. The wire cables for the Brooklyn bridge were made of American steel.

1884—In 1884 we commenced to import iron ore from Cuba.

1884—The first basic steel made in the United States was produced experimentally at Steelton, Pennsylvania, by the Pennsylvania Steel Company, on May 24, 1884, in a Bessemer converter.

1884—In 1884 there were still in existence in this country several slitting mills, which were used spasmodically in the conversion of iron into nail rods. There was a slitting mill at the Cambridge rolling mills near Boston; another at the Norway steel and iron works at South Boston; another at the Eagle iron works at Roland, Centre county, Pennsylvania; and another at the Oxford iron and steel works at Frankford, Philadelphia.

1887—The first contract for American-made armor was made by the Navy Department with the Bethlehem Iron Company on June 1, 1887, and was for two battleships and four monitors, and called for 6,700 tons of plain steel armor, oil-tempered and annealed, at an average price of $536 per ton. But the first armor actually made in this country was made by this company in 1890.

1888—The beginning of the manufacture of basic steel in this country as a commercial product dates from 1888, on the 28th of March of which year the first basic open-hearth steel was produced at the Homestead steel works of Carnegie, Phipps & Company, Limited, at Homestead.

1890—The production of pig iron in 1890 was 9,202,703 tons.

1890—In this year the United States for the first time made more pig iron than Great Britain. This leadership was steadily maintained until 1894, when it was lost, but in 1895 it was regained. In 1896 it was again lost, but it was again regained in 1897 and has since been maintained.

1890—The world's production of pig iron in this year is given in *Iron in All Ages* as 26,968,468 tons, and the world's production of steel in the same year as 12,151,255 tons. The percentage of pig iron produced by the United States was 34.1, and its percentage of steel was 35.2.

1897—Two miles below Niagara Falls the Pennsylvania Steel Company, of Steelton, Pennsylvania, erected in 1897 a double-deck steel arch bridge over the Niagara river, the central arch of which is 550 feet long. The upper deck is for the use of trains of the Grand Trunk Railroad and the lower deck is for the use of carriages and foot passengers. This bridge and the one mentioned below are among the world's great bridges.

1897—In 1897 the A. and P. Roberts Company, of Philadelphia, erected a steel arch bridge over the Niagara river, below the Falls. The length of the main arch span is 840 feet, and

there are two approach spans of 210 feet and 190 feet respectively. The height of the roadway above the water line is 185 feet. The bridge is 46 feet wide.

1900—Mr. Poor reports that in 1900 there were 257,853 miles of railroad track in the United States, including second track and sidings, of which 239,629 miles were laid with steel rails and 18,224 miles were laid with iron rails.

1900—The production of pig iron in 1900 was 13,789,242 tons.

1900—In 1872 the production of spiegeleisen and ferro-manganese was 4,072 tons; in 1880 it was 17,503 tons; in 1890 it was 133,180 tons; and in 1900 it was 255,977 tons. These figures are included in the statistics of pig iron already given.

1900—The world's production of pig iron in 1900 we estimate to have amounted to about 40,400,000 tons. Of this total estimated production the United States made 34.1 per cent.

1900—The production of crucible steel in 1874 was 32,436 tons; in 1880 it was 64,664 tons; in 1890 it was 71,175 tons; in 1899 it was 101,213 tons; and in 1900 it was 100,562 tons.

1900—The production of open-hearth steel in 1869 was 893 tons; in 1870 it was 1,339 tons; in 1880 it was 100,851 tons; in 1890 it was 513,232 tons; and in 1900 it was 3,398,135 tons.

1900—In this year the United States for the first time made more open-hearth steel than Great Britain.

1900—The production of Bessemer steel in the United States in 1867 was 2,679 tons; in 1870 it was 37,500 tons; in 1880 it was 1,074,262 tons; in 1890 it was 3,688,871 tons; and in 1899 it was 7,586,354 tons. The production in 1900 was 6,684,770 tons.

1900—The production of all kinds of steel in the United States in 1867 was 19,643 tons, Bessemer steel included; in 1870 it was 68,750 tons; in 1880 it was 1,247,335 tons; in 1890 it was 4,277,071 tons; in 1899 it was 10,639,857 tons; and in 1900 it was 10,188,329 tons.

1900—The production of Bessemer steel rails in 1867 was 2,277 tons; in 1870 it was 30,357 tons; in 1880 it was 852,196 tons; in 1887 it was 2,101,904 tons; in 1890 it was 1,867,837 tons; and in 1900 it was 2,383,654 tons.

1900—In 1871 the United States imported 82,969 tons of tinplates; in 1880 it imported 158,049 tons; in 1890 it imported 329,435 tons; and in 1900 it imported 60,386 tons.

1900—In the last six months of 1891 our production of tin plates and terne plates was 999 tons; in 1895 it was 113,666 tons; in 1899 it was 360,875 tons; and in 1900 it was 302,665 tons.