

AMERICAN  
IRON AND STEEL  
ASSOCIATION

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PRESENTED BY

*J. S. Weitz*







REPORT OF  
The Secretary

OF THE

AMERICAN

Iron and Steel Association.

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*Read at the Regular Annual Meeting of the Association  
Philadelphia, January 11, 1872.*

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PHILADELPHIA, PA. :  
PENN MONTHLY OFFICE, 627 WALNUT STREET.  
1872. /



## MINUTES.

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THE regular Annual Meeting of the American Iron and Steel Association was held, pursuant to notice, at the rooms of the Association, 522 Walnut Street, Philadelphia, on Thursday, January 11, 1872, at 11 o'clock, A. M., Samuel J. Reeves, Esq., President of the Association, in the chair.

Representatives from a large number of establishments, situated in eight States, were present.

The minutes of the last Annual Meeting were read and approved.

President Reeves addressed the meeting, alluding to the operations of the Association, suggesting some extension of its sphere of usefulness, and calling attention to the proposed reduction of duties by Congress.

The Secretary, Henry McAllister, Jr., then read his annual report, which was unanimously accepted, and ordered to be printed.

The report of the Treasurer, Charles Wheeler, Esq., was read, accepted and ordered to be filed.

The following resolutions were unanimously adopted :

*Resolved*, That in the opinion of this Association the recent reduction in the duty on pig iron by the Forty-first Congress was unwise, and injurious to the general interests of the country; that to this cause mainly should be attributed the fact that the make in 1871 did not exceed that of 1869, as many contemplated enterprises in this direction have been suspended or altogether abandoned, which, had they been proceeded with, would have increased the production fifteen to twenty per cent. over the present make, and so have furnished an ample supply of this necessary article of our own manufacture; and we further believe that any similar reduction of duty on bar iron, rails, plates, shapes, steel of all kinds, and any other of the numerous manufactures of our rolling mills and other works, would result in disaster to those branches of industry, and stop their extension. Such a result might be gratifying to importers and foreign manufacturers, but would in no wise contribute to the growing wealth and comfort of the American people.

*Resolved*, That the manufacturers of iron and steel, and all others engaged in home production, ought to take a stern and decided stand against any and every attempt on the part of foreigners and their representatives in this country, whether acting individually or by associations, to effect a further reduction of

duty on such articles of foreign manufacture as compete with home productions.

*Resolved*, That the result of such a reduction of duties upon iron and steel as is proposed by the free traders and revenue reformers, would be practically to transfer the duties thereby lost by the Treasury to the pockets of foreign manufacturers of these fabrics.

*Resolved*, That the great and unprecedented development of our resources, the increase of our varied industry, the large employment of labor at wages higher than are paid in other countries, and the financial soundness and prosperity of the nation, which have been enjoyed under our present tariff system, prove the utility and expediency of that system, and impose upon Congress the obligation of great caution in attempting to alter it.

*Resolved*, That should modifications be undertaken in our tariff laws, no changes should be made to the injury of wages or capital employed in industrial enterprises by the reduction of duties on articles produced or manufactured largely in this country, such as wool, woolens, cotton goods, iron, steel, etc., but that the duties should be abolished upon necessities of life or raw materials for manufacture not here produced, such as coffee, tea, foreign dye stuffs, drugs, etc.

*Resolved*, That it is the duty of Congress to maintain the system of protection under which our manufacturers can survive while paying wages so much above those paid by our foreign competitors. Should Congress so legislate as to necessitate material reduction in the wages paid by industrial establishments, a disastrous revolution would occur in the relations between manufacturers and agriculturists which are now so harmonious. Hundreds of thousands of workmen now engaged in mining and manufacturing would, as former experience has proved, be thrown into idleness, or into agriculture, thus overstocking the markets for farm produce, and leaving the country at the mercy of foreigners for the needed supplies of manufactured goods.

On motion adjourned.

HENRY McALLISTER, Jr., *Secretary*.

## REPORT OF THE SECRETARY OF THE AMERICAN IRON AND STEEL ASSOCIATION.

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*Read at the Annual Meeting of the Association at Philadelphia,  
January 11, 1872.*

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MR. PRESIDENT AND GENTLEMEN: In taking a review of the history of the iron manufacture in the United States, from the period when the business may be said to have assumed the dimensions of an industry, to the present time, a deplorable but ever-present feature is observable, standing out with especial prominence—a feature that constitutes a formidable obstacle to the peace of mind of the American iron-maker, and to the proper development of his business. It is the apprehension that the capital invested in his calling may be at any moment partially or wholly swept away, his works closed, his operatives thrown out of employment and reduced to a state of suffering or beggary by a reduction of the tariff, the only barrier that stands between the American manufacturer—employer and employed—and ruin. In the history of that branch of business which you represent, the paralyzing effect of this fear has ever been apparent, especially so up to a period of time two or three years back. It induced the established iron manufacturer to hesitate before extending his works to meet that demand for his products which his abiding confidence in the continued growth of the country led him to anticipate. It deterred others, even during times of comparative prosperity, from investing their capital in a pursuit, the success, in fact the very existence, of which depended upon discreet legislation, a steady, unchanging protective policy. And if there have been brief seasons during which the capacity to produce iron in this country has fallen behind the demand, such conditions have invariably

resulted either from adverse legislation or from justly entertained apprehensions of it. About three years ago a feeling of greater confidence in the stability of our tariff system became apparent. It was thought that the satisfactory condition of the material interests of the country, and the revenue requirements of the government, were sufficient guarantees that nothing would be attempted that might disturb or endanger either. Confidence was inspired, and confidence was followed by an unprecedented and rapid growth in nearly all the important industries of the country, and none responded more nobly than the iron and steel interests. It is unnecessary here to give the details of that growth. It is sufficient to say that in 1869 the production of pig iron amounted to over 1,900,000 tons, having more than doubled in four years, while other branches of the business exhibited a gratifying increase. Nor was this growth confined to the old iron-producing States. The attention of the people of the great West was directed anew to their mineral resources, and scores of furnaces and mills arose to supply her busy people with this element of civilization and power. The South, too, commenced to look to the development of her coal and iron mines as the surest and best means of resuscitating her shriveled energies.

But that feeling of confidence was not long to continue. The very prosperity which it promoted alarmed the enemies of American industry, and impelled them to renew their efforts to induce Congress to step in to the aid of foreign manufacturers, before this market should be lost to them forever. And so far as relates to one branch of our business they were successful. The duty on pig iron was reduced two dollars per ton. The direct result of such reduction was, though injurious, but trifling when compared with the indirect effect. It was looked upon by the trade generally as the inauguration of a policy that, if pursued, would reduce the dimensions of our vast industries to their colonial meagerness. It was regarded by foreign manufacturers as a triumph, and they had not the discretion to conceal their delight, so the event was bruited over the world as a victory for British diplomacy. A dispatch from Scotland announced an advance of several shillings per ton in the price of Scotch pig iron in consequence of the reduction of the American tariff, a significant if not an encouraging piece of news for the consumers of Scotch pig iron here.

A prominent iron trade journal published in London, in speaking of this reduction of duty, said: "We hope that our iron-masters, in view of the late action of the American Congress, will lose no time in increasing the capacity of their works, in order to be prepared for the increased demand from that country for English iron, which is sure to follow the adoption of a more liberal tariff policy."

It is the custom of free-trade orators and essayists of this country to claim to speak and write solely in the interests of consumers; but those whose experience and observations enable them to discern the truth, very well know that all the well-considered and thoroughly organized assaults upon our tariffs are directed from abroad. The consumers of three-fourths of all the pig iron made in the country, not only did not ask for the reduction of duty from \$9 to \$7 per ton, but actually opposed it upon the ground that it would check the vast preparations at that time being made to increase the home production; and enlightened consumers of iron of all kinds know that their interests are promoted by the prevalence of a policy that gives them a home supply of the materials used in their business, at a price regulated by an uninterrupted home competition. This is one of the chief advantages of protection; but of all the positions assumed by protectionists, this is the one least understood, and its soundness most frequently questioned. Many admit that protection, by fostering home production, leads to a desirable independence of other nations, which sometimes, as in the case of war, may be essential to national safety; that it also results in diversifying industries and relieving us of the perils of famine; that it builds up a home market for the products of agriculture, etc. But after making all these admissions, and while favoring a protective tariff, they are inclined to look upon it as a tax, and as tending to increase the cost of everything upon which it is imposed. Your Secretary was informed a few days ago, by a gentleman who has just returned from a visit to the mines and manufacturing establishments of the West, that such views generally prevail throughout the agricultural regions there. Tariffs are unpopular among superficial reasoners, simply because they are thought to enhance the value of all home as well as foreign products. Convince them of the fallacy of this favorite assertion of free-trade propagand-

ists, and their opposition, which is rather passive than active, will cease. If we fail to do this it will be owing, not to inability to enforce our views by the application of examples, but to the difficulty in reaching, in an effective manner, those whom we desire to convince. The philosophy of protection cannot be thoroughly understood at a glance. Its truths must be inculcated by reason and established by actual experience. Free trade brooks no such obstacles as these; in fact it avoids reason, and ridicules the teachings of experience. It appeals to popular impulse by crying, "Monopoly," and "Tariffs are taxes," and boasts of proselytes thus made.

In regard to the effect of a protective tariff upon prices, it may safely be asserted that its tendency is to lower the cost of every article that can be produced in unlimited quantities, and of good quality, in this country. We challenge our opponents to disprove the truth of this assumption. If irregularities have occasionally occurred in the operation of this law, their causes can be clearly traced to the absence of a fair opportunity to test the principle. But, despite such adverse circumstances as a vacillating tariff policy, and the brevity of the history of even our oldest industries, statistics will prove the accuracy of the assertion that consumers are benefited by the application of the protective policy to all articles included in the general category above indicated. Although this has been shown, in many instances with a clearness beyond controversion, your secretary will cite a few conspicuous examples of the influence of protection upon the prices of two of the principal articles of the iron manufacture—pig iron and rails—not that the principle applies more especially to these than to all other kinds of iron and steel, but because upon their production depends in a great measure the prosperity of most branches of the iron manufacture, and because among the strongest opponents of a protective tariff are included many large consumers of rails whose positions give them an influence that is exerted potently against us.

Under the tariff of 1842 our manufactures revived and drove out millions of dollars' worth of British goods, and lowered the prices of such as did reach this country. Two or three rail mills only were at that time in operation, but several others were erected within a few years following, and the make of rails largely



increased. Such was the impetus given to home production that the compromise tariff of 1846-7 did not at once prostrate our industries. One season of protection brought the price of rails down to \$50 per ton, but in 1848-9 over 200,000 tons of English rails were thrown upon our market and sold down to \$40 per ton, with the avowed purpose of closing our works, and by so doing breaking down American competition. Our rail-makers asked Congress for protection against actual loss or enough to allow them \$50 per ton, but the request was refused, and their foreign rivals succeeded in a great measure in accomplishing their purpose. They then stepped in for our trade, and before competition could be fully restored supplied us with no less than 1,150,000 tons from 1851 to 1855, the price advancing from \$40 to \$81 per ton. American consumers paid during that brief period over \$20,000,000 more than they would have been required to pay had the price remained at the point at which our mills could have been sustained. It is worthy of notice, in this connection, that in 1851, when Welsh rails were selling in England at \$26 per ton, the price in New York was \$40, the duty being 30 per cent. ad valorem; while in 1855 the price abroad was \$36—an advance of \$10 there—and in New York \$80—an advance of \$40 here, the duty being the same. It will readily be observed that English rail-makers were well repaid by the enormous profits of those four years for the slight loss suffered in destroying competition here. From 1842 to 1847 the duty on pig iron was \$9 per ton. During that period the price was remarkably steady, fluctuating only between \$25.50 and \$30 per ton, averaging in this city about \$27.50 per ton. Our average annual imports of pig iron amounted to less than 20,000 tons. The tariff of 1846-7 reduced the duty to 30 per cent. ad valorem, equivalent to but little over \$3 per ton. The importation increased to 105,000 tons in 1849, and the price receding to less than \$20, many of our furnaces were blown out, and the workmen driven into other pursuits. The price then rose to \$37 per ton, and our imports to 160,000 tons per annum. The profits of foreign makers upon the pig iron sent to this country in 1853-4 could not have been less than \$5,000,000.

A more recent illustration of the principle in question is found in the history of the production and prices of steel rails. In 1864,

just before the completion of the first Bessemer steel works in this country, the price of English steel rails in New York and Philadelphia was \$162 in gold. In 1865 two works were in operation here, and foreign rails were lowered to \$120. Two years later, in 1867, a third works started, and two or three new companies were organized to further extend the manufacture, and foreign rails fell to \$110, gold, per ton. In 1869, the capacity of our works was equal to the American demand, nearly \$5,000,000 had been invested in the business, and foreign rails were put down to \$80 gold, per ton. At that price they could not be made here, and the business was threatened with destruction. Ninety-five intelligent consumers of steel rails, alarmed at the prospect of being placed at the mercy of foreign makers, appealed to Congress to save our manufacturers by increasing the duty on imported rails. This was done, our works responded with renewed vigor to the increasing home demand, the price rose to a point at which a moderate profit could be made (about \$105 per ton), and has since fluctuated but little. There can scarcely be a doubt that, had Congress not acted promptly in the premises, our works would have been closed, the capital invested in them sunk, their skilled labor driven into some other occupation, and the business so disorganized that, before resumption of operations could have taken place, American consumers would have suffered as severely as in the two instances previously given.

#### STATISTICS.

As but ten days have elapsed since the close of the year 1871, it is, of course, impossible to do more than estimate the production of many kinds of iron and steel during that year. Your secretary has succeeded, however, in obtaining returns from the anthracite furnaces and rail mills, with but few exceptions—in which cases estimates that cannot be far wrong have been made—and the following figures may be relied upon as substantially correct.

The production of anthracite pig iron for the year in the Lehigh region was 372,009 tons,\* the product of forty-three furnaces, many of which were out of blast during a considerable part of the year, owing to the long strike of the coal miners. Several new furnaces

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\*Tons of 2,000 pounds in all cases except when otherwise stated.

are now being built, which will increase the capacity of the region to at least 450,000 tons per annum. The following statement shows the progress of the pig iron manufacture in this locality since 1849:

Year.	Production.	Year.	Production.
1849.....	44,347 tons.	1863.....	192,740 tons.
1854.....	92,323 "	1864.....	214,093 "
1855.....	114,698 "	1865.....	177,438 "
1856.....	145,161 "	1866.....	257,016 "
1857.....	131,078 "	1867.....	262,000 "
1858.....	127,839 "	1868.....	287,200 "
1859.....	161,431 "	1869.....	300,916 "
1860.....	173,075 "	1870.....	
1861.....	147,418 "	1871.....	372,009 "
1862.....	156,696 "		

The production of the furnaces at Phillipsburg, New Jersey, is included in the quantities given above.

The production of the furnaces in the Schuylkill region in 1871, was 157,305 tons. The coal strike, although it curtailed production to a considerable extent here also, as well as along the Susquehanna and Hudson rivers, did not result in such a general stoppage as took place in the valley of the Lehigh. The make of pig iron in this region in 1849 was 23,436 tons, the product of eight furnaces, and it has steadily grown to the dimensions indicated above. It is now rumored that arrangements are being made for building a number of furnaces at Reading, partially under the auspices of the Reading Railroad Company, which, if successfully carried out, will largely increase the production of pig iron in the valley of the Schuylkill.

The furnaces in the valley of the Susquehanna and its tributaries, have been, for convenience, divided into two groups; those from Harrisburg down constituting the Lower Susquehanna group, and those above Harrisburg the Upper Susquehanna group. The furnaces in the former, or Lower group, made in 1871, 143,777 tons. In 1849 the product was 24,256 tons; in 1855, 70,335 tons; in 1860, 101,246 tons, and in 1865, 78,675 tons. Of the product in 1871, 128,769 tons were made in Pennsylvania, and 15,008 tons in Maryland.

In the Upper Susquehanna group, the production in 1871, amounted to 90,600 tons. In 1849, eleven furnaces made 26,625 tons, since which the average annual increase has been about 2,900 tons.

The anthracite furnaces east and north of Pennsylvania (excepting the furnaces at Phillipsburg, N. J., included in the Lehigh region), comprising the Eastern group, made in 1871 193,917 tons. In 1854 twelve furnaces were in blast in this district, making 47,168 tons. During the following eight years the average annual production was 70,000 tons. In 1863 it rose to 117,491 tons; in 1865 it fell to 81,615 tons, and has since steadily advanced to the quantity above stated in 1871.

The whole production of anthracite pig iron in the United States, in 1871, was 957,608 tons, and the growth of this branch of manufacture is shown by the following table:

In 1854 the production was 339,435 tons.			
" 1855	"	381,866	" Increase 12 per cent.
" 1856	"	443,113	" " 16 "
" 1857	"	390,385	" Decrease 12 "
" 1858	"	361,430	" " 7 "
" 1859	"	471,745	" Increase 30 "
" 1860	"	519,211	" " 10½ "
" 1861	"	409,229	" Decrease 21 "
" 1862	"	470,315	" Increase 15 "
" 1863	"	577,638	" " 23 "
" 1864	"	684,018	" " 11 "
" 1865	"	479,558	" Decrease 30 "
" 1866	"	749,367	" Increase 51 "
" 1867	"	798,638	" " 7 "
" 1868	"	893,000	" " 12 "
" 1869	"	971,150	" " 9 "
" 1870	"	930,000	" Decrease 4¼ "
" 1871	"	957,608	" Increase 3 "

The present annual capacity of our anthracite blast furnaces, including those nearly ready to be blown in, is about 1,275,000 tons.

As before stated, it is not now possible to give the product of the raw bituminous coal, coke and charcoal furnaces, for last year with accuracy, but the very full reports already received from many of the principal iron regions of the country enable us to estimate the production, with sufficient precision for practical purposes, as follows:

Raw Bituminous Coal and Coke Pig Iron.....	570,000 tons.
Charcoal.....	385,000 tons.

The total production of pig iron in the United States in 1871, may, therefore, be set down at 1,912,608 tons, against 1,865,000 tons in 1870; 1,916,000 tons in 1869; 1,603,000 tons in 1868;

1,461,626 tons in 1867; 1,350,943 tons in 1866, and 931,000 tons in 1865.

The utmost present annual capacity of the blast furnaces of the United States is about 2,500,000 tons.

The total production of rails in the country in 1871, amounted to 775,733 tons, as compared with 620,000 tons in 1870; 593,586 tons in 1869; 506,714 tons in 1868; 462,108 tons in 1867; 430,778 tons in 1866, and 356,292 tons in 1865. Of the product of 1871, 715,691 tons were iron and 60,042 tons steel and steel-headed. The following statement shows the localities in which these rails were manufactured:

Pennsylvania.....	335,604 tons.	Maine.....	13,383 tons.
Illinois.....	91,178 "	Indiana.....	12,778 "
New York.....	87,022 "	Tennessee.....	9,667 "
Ohio.....	75,782 "	Missouri.....	8,200 "
Maryland.....	44,941 "	New Jersey.....	6,700 "
Wisconsin.....	28,774 "	Georgia.....	7,840 "
Massachusetts.....	28,864 "	West Virginia.....	5,000 "
Michigan.....	14,000 "	Kentucky.....	6,000 "

The reports received from the rail mills indicate that a large number were in operation during a *part* of last year only. There are forty-eight rail mills in the country, and their utmost annual capacity is placed at about 1,000,000 tons.

The production of rolled and hammered iron other than rails, in 1871, is estimated at 700,000 tons, which may be analyzed about as follows:

Merchant bar and rod.....	335,000
Sheet and Plate.....	118,000
Hoop.....	22,000
Nails and Spikes.....	155,000
Axles and other.....	80,000
Total.....	710,000

The product of steel of all kinds, in 1871, is estimated at 82,000 tons, of which 45,000 tons were made by the Bessemer process.

The manufactures of rails, bar iron and steel, have been close non-remunerative branches of business for several years, and those engaged in them naturally feel alarmed at the threatened reduction of duty, which, however slight, would certainly result disastrously. Many of our friends in Congress have been furnished

with facts relative to this subject, which, it is hoped, they will be able to use with effect in averting the threatened blow at these interests, now desperately struggling to maintain themselves.

Few manufactures combining so much that is difficult and expensive in their preliminary steps, have been transplanted to this country with more immediate success than has been the case with the Bessemer steel industry. The former President of this Association, with indefatigable perseverance, showed the possibility of using American metal in its production, and laid before the Association on the occasion of its meeting in Chicago, in 1865, the first steel rail produced west of the Alleghany mountains. The manufactory at Troy had already produced steel, and its managers were then laboring diligently in surmounting the difficulties in the way of the new industry. In 1865-6 the second and third converters were erected at Troy. In 1866-7 the Pennsylvania Steel Company built their works and put two converters in operation, at Baldwin, near Harrisburg, Pa.

In 1868-9 the Cleveland Iron Company put two converters in operation, and have just started two more. Chicago has four in operation and Joliet will soon have two, the works being wellunder way. The Cambria Iron Company have two in operation, and contemplate putting up two more this year. The Pennsylvania Steel Company have materials on hand for building two additional. The Bethlehem Iron Company will put two in operation the present year, and probably four more next year.

The total number of converters in use in the United States is, therefore, fifteen, with fourteen more to be started during the current year. Allowing 350 blows of five tons each per month for each pair, we have within our borders machinery now capable of producing 157,500 tons, and when the fourteen now being built are started, an additional 147,000 tons, making a total of 304,000 tons of Bessemer steel per year. England still leads us, however, in the production of this metal, and large works are in progress.

The following list of Bessemer establishments is believed to embrace all that now exist in Great Britain:

NAME OF WORKS.	LOCALITY.	NO. CONVERTERS.	SIZE.
John Brown & Co., (Lim.)	Sheffield,	6 { 2	15 } tons.
Charles Cammell & Co.,	"	2	10
" "	Penistone,	4	7½
Saml. Fox & Co.,	Deepcar,	4	5
Henry Bessemer & Co.,	Sheffield,	2	5
" "	"	2	3½
" "	"	1	10
Patent Shaft & Axle Co.,	Wednesbury,	2	5
Bolton Iron & Steel Co.,	Bolton,	2	3½
Railway Steel & Plant Co.,	Manchester,	4	5
Bolckow, Vaughn & Co.,	Gorton, Manchester,	4	3
Sir Joseph Whitworth,	Manchester,	2	5
Mersey Steel & Iron Co.,	Liverpool,	1	4
London & N. W. R. W. Co.,	Crewe,	4	5
Barrow Hematite Steel Co.	Barrow,	4	5
" " "	"	6	5
Douglas Iron Co.,	Merthyr Tydvil,	12	7
Ebbw Vale Iron Co.,	Ebbw vale,	6	5
Weardale Iron & Steel Co.,	Ferry Hill,	6	5
		4	3

The following companies are now engaged in erecting converters:

Rowland & Co.,	Glasgow,	2-3 tons.
Bolckow, Vaughn & Co.,	Middleton.	
West Cumberland	} Workington.	
Hematite Iron Co. (limited),		
Carnforth Hematite	} Carnforth.	
Iron Co. (limited)		

The whole number of converters now in use in Great Britain is therefore 76, having a united capacity of 421 tons. Fifteen or twenty additional converters are being built.

American Bessemer steel makers are daily becoming more independent of foreigners. Already they have discovered a number of pig irons adapted to their purpose. New Jersey furnishes a species of spiegeleisen which supplants in part the article so largely imported from Westphalia, while the refractory stones of our own strata now yield the ganister which was first brought from Sheffield and Wales.

The manufacture of steel by the Siemens-Martin process is being carried on with success at Trenton, New Jersey.

The product of the forges and bloomeries of the country amounted to 63,000 tons in 1871, which is about 10,000 tons below the average of the last ten years.

During the three years ended on the 30th of June 1869, 1870 and 1871, the following quantities of foreign iron and steel entered into consumption in the United States: Of pig iron, 149,303 tons in 1869, valued at \$2,072,288.34; 201,378 tons in 1870, valued at \$2,412,573.93, and 210,568 tons in 1871, valued at \$3,257,634.11—an increase of 61,265 tons in two years. Of the quantity imported in 1871, 76,839 tons were imported prior to, and 133,729 tons subsequent to the reduction of the duty from \$9 to \$7.

During the three years above indicated the customs duty paid on imported pig iron amounted to \$5,071,253.34. Of all kinds of rolled and hammered bar iron we imported 86,555 tons, valued at \$3,215,777, in 1869; 76,277 tons, valued at \$3,028,213.30, in 1870, and 91,696 tons, valued at \$3,694,173.51, last year. More than nine-tenths of all the bar iron imported is classified as "flats, not less than one inch nor more than six inches wide, nor less than three-eighths nor more than two inches thick; and rounds, not less than three-quarters nor more than two inches in diameter; and squares, not less than three-quarters nor more than two inches square," and pays one cent per pound, which is certainly a very moderate rate of duty. The duty paid on imported bar iron in 1871 amounted to \$1,882,889.46, and for the past three years, to \$5,280,707.93.

Of railroad iron we imported 250,976 tons, valued at \$6,777,406.00, in 1869; 323,459 tons, valued at \$9,678,305.67, in 1870, and 450,090 tons, valued at \$14,657,960.70, during the year ended June 30th last. Of boiler and other plate iron we imported 361 tons, valued at \$24,412.26, in 1869; 436 tons, valued at \$32,019.97, in 1870, and 228 tons, valued at \$21,735.00 in 1871. Of common sheet-iron we imported 9,867 tons, valued at \$447,914.57, in 1869; 6,364 tons, valued at \$305,698.13, in 1870, and 8,622 tons, valued at \$402,578.03, in 1871. Of Russia sheet-iron we imported 2,700 tons, valued at \$489,112.00, in 1869; 2,290 tons, valued at \$408,840.00, in 1870, and 2,099 tons, valued at \$380,588.00, in 1871. Of band, hoop and scroll iron we imported 9,046 tons, valued at \$372,369.83, in 1869; 15,718 tons, valued at \$635,819.90, in 1870, and 16,633 tons, valued at \$723,984.77, in 1871. Of old scrap iron there were imported 156,183 tons, valued at \$3,559,823.06,



in 1869; 166,017 tons, valued at \$3,168,898.91, in 1870, and 177,576 tons, valued at \$3,850,306.08, in 1871. Of the total quantity imported in 1871, 3,944 tons were cast and 173,632 tons were wrought. As near as it is possible to estimate, about 90,000 tons were old rails imported from England. Of all other iron and manufactures of iron we imported 20,266 tons, valued at \$3,550,729.20, in 1869; 17,919 tons, valued at \$4,103,562.38, in 1870, and 22,556 tons, valued at \$4,863,074.63, in 1871.

Of railway bars, wholly of steel, we imported during the year ended June 30th, 1871, 50,162 tons, valued at \$2,328,520.00. Of these, 20,979 tons were imported during the last six months of 1870, and paid 45 per cent. ad valorem; and 29,183 tons during the first half of 1871, and paid 1¼ cents per pound. Of railway bars made partly of steel we imported in the same time 264 tons, valued at \$12,548. Judging from the small quantity of the latter returned, there is reason to believe that many rails partly of steel, principally perhaps of Belgian manufacture, came in as iron rails, or steely-iron rails, paying the iron duty only. Prior to the year 1871, the records of our many ports of entry are too confused to enable us to give the quantity of steel rails imported. They are therefore included under the general head, "steel in forms not specified," in 1869 and 1870. Of steel in ingots, bars, sheets and wire not less than one-quarter inch in diameter, we imported 19,700 tons, valued at \$2,596,013.41 in 1869; 15,757 tons, valued at \$2,013,577.23 in 1870, and 20,882 tons, valued at \$2,830,067.01 in 1871. It is noticeable that more than one-half, during some years fully three-fourths, of the steel imported, being all consigned to the agencies in this country of foreign steel makers, is classed as "steel, valued at 7 cents per lb. or less," and consequently pays the lowest rate of duty. The very best evidences have been adduced to prove that a system of undervaluation has been practiced for many years, for the purpose of evading the payment of the proper rates of duty; and although the attention of the Treasury Department has frequently been called to the subject, through capable and honest customs officials and others, the practice, it is charged, still continues.

The value of all the other steel and manufactures thereof imported in 1869, was \$6,844,460.45; in 1870, \$6,564,817.67; and in 1871, \$6,232,949.84.

It will thus be seen that the declared dutiable value of iron and manufactures thereof imported in the year ended June 30th,

1871, was.....	\$31,852,034.83
And of steel and manufactures thereof.....	\$11,404,084.85
Total.....	\$43,256,119.68

Of the foreign pig iron consumed in 1871, there was withdrawn from warehouse, 37 per cent. ; of bar iron of all kinds, 39 per cent. ; of railroad iron, 44 per cent. ; of common sheet-iron, 18 per cent. ; of Russiasheet, 90 per cent. ; of band, hoop and scroll iron, 7 per cent. ; of old scrap iron, 6 per cent. ; of steel in ingots, bars and sheets, 6 per cent. ; of steel railway bars, 6½ per cent.

Your Secretary has had frequent occasion to allude, during the past three or four years, to the heavy importations of rails, but the quantity imported during the year just closed, largely exceeded that of any year in the history of the country. The records of the United States Treasury Department, from which the figures previously given, showing the imports of iron, were obtained, are not made up to a later period than June 30th, 1871. We find later figures than these, however, in the very full and accurate reports of the British Board of Trade. The last report of that body has just reached us, and shows that during the past year, ended December 31st, there were shipped to this country, principally from the ports of South Wales, the enormous quantity of 572,386 tons of rails, against 472,403 tons in 1870; and 336,500 tons in 1869. The aggregate exports to this country for the year just closed, were very nearly one-half of our whole consumption of rails. During the month, ended June 15th, we imported over 70,000 tons, two-thirds of which probably went direct to Southern ports. More than one-half the rails exported from Great Britain during the year above indicated, were shipped to the United States. Indeed, the total exports of rails from Great Britain in 1871, show a considerable falling off as compared with those of the two previous years. The heaviest decline was in the shipments to India and Russia, the roads in the latter country being now generally built largely by the aid of the Government, which stipulates that all the iron used in their construction must be of home manufacture. In consideration of the loud and continuous complaints of the so-called revenue reformers of the restraints upon importation growing out of our tariff system, it is

curious to mark the course of the rail trade of Great Britain during the past few years.

Taking the four countries which take about three-fourths of the railroad iron exported from Great Britain, the figures for the years 1869, 1870 and 1871, stand as follows: In 1869, Russia imported 283,166 tons of English rails; in 1870, 232,597 tons; and in 1871, 88,613 tons, being a decrease of nearly 200,000 tons in two years. India imported in 1869, 110,606 tons of English rails; in 1870, 171,513 tons; and in 1871, 38,872 tons. Germany imported in 1870, 58,979 tons, and in 1871, 56,323 tons. In order to show the terrible consequences of the "prohibitory policy" (for such our opponents delight in calling it) of our government, we will go a few years further back. In 1865, Great Britain shipped to this country 63,327 tons of rails; in 1866, 117,878 tons; in 1867, 185,041 tons; in 1868, 300,329 tons; in 1869, 336,500 tons; in 1870, 472,403 tons; and in 1871, 572,386 tons. In view of the importance of the American market to English iron-makers, it is not strange that they should labor with the greatest assiduity, and be both able and willing to expend money freely to create here a popular sentiment in their favor, in order to maintain it; but in view of the disastrous consequences that have always followed the triumph of the alien system of free trade in this country, it is singular that there should be any considerable number of proselytes to such a policy, among thoughtful and patriotic Americans.

The shipments of pig iron from Great Britain to the United States materially increased also during the past year, amounting to 210,687 tons, as compared with 126,515 tons in 1870, and 148,383 tons in 1869. The heaviest shipments were made in November, amounting to 25,091 tons. Although Scotch pig and the classes of metal known as Bessemer pig iron, constituted the bulk of the shipments to this country, yet within the year very considerable quantities of the lower priced metal from what is known as the Cleveland district, in the North of England, were sent hither, and sold below the general cost of production in this country.

#### PROGRESS OF THE IRON AND STEEL MANUFACTURE IN THE WEST.

The iron and steel manufactures have become important branches of business in several of the Western States. During the year just

closed the quantity of iron ore shipped from the Lake Superior region, Michigan, amounted to 910,984 net tons. Adding to this the quantity consumed by the furnaces within the district, the whole quantity mined reached very nearly 1,000,000 tons. The rapid growth of this branch of business is exhibited in the following table compiled by the able editor of the *Marquette Mining Journal*.

TONS OF 2000 LBS.				TONS OF 2000 LBS.			
In 1856 the production was	7,840	In 1864 the production was	263,338				
" 1857 " " "	23,520	" 1865 " " "	219,807				
" 1858 " " "	34,759	" 1866 " " "	332,609				
" 1859 " " "	73,560	" 1867 " " "	522,005				
" 1860 " " "	130,937	" 1868 " " "	568,750				
" 1861 " " "	50,882	" 1869 " " "	709,387				
" 1862 " " "	129,608	" 1870 " " "	959,247				
" 1863 " " "	207,488	" 1871 " " "	910,984				

The pig iron made in the Lake Superior region in 1871 amounted to 57,372 tons, as compared with 53,589 tons in 1870.

For many years prior to 1867 no pig iron whatever was made in Indiana. In that year three stacks were built—one at Brazil, one at Harmony, and another at Knightsville. In 1868 another stack was built at Knightsville, and in 1869 another at Brazil, and one at Terre Haute. These furnaces are all in Clay county, Indiana, and use for fuel the block coal of that county (a specimen of which is submitted), which is said to be remarkably well adapted to iron and steel making. About 3,500 tons of this coal is mined per day, and a considerable quantity is shipped to St. Louis for use in the iron manufacture in the vicinity of that city. The furnaces in Clay county cost from seventy thousand to one hundred and fifty thousand dollars per stack, are from 40 to 60 feet high and from 10½ to 14 feet bosh. The six have a capacity of about 130 tons of metal per day. But little dependence is placed on the local ores, those used being mainly from Lake Superior, and the Missouri ores from Iron Mountain, and hematite ore from near Cuba, Mo. The former is transported from 500 to 600 miles, 325 of which are by water to Chicago, and the latter a distance of 250 miles, altogether by railroad. The furnaces in Clay county have been out of blast during the greater part of the past year, but they have, with one exception, been blown in within a month.

In Illinois, the growth of the iron manufacture has been still

more rapid and extensive. In the vicinity of Chicago are several furnaces, which, for size, excellence of construction and yield of metal, are surpassed by few in the country. This State has become second to Pennsylvania only as a producer of rails, the product for the year 1871, as previously given, being 91,178 tons. The make of pig iron by the seven furnaces in blast in 1871, was 65,000 tons. Two of the seven furnaces that have been out of blast for some time, are about being blown in. The estimated production for 1872 is from 80,000 to 85,000 tons, unless Congress interferes to check its growth.

Wisconsin is rapidly developing her mineral resources. In addition to the charcoal furnaces that have been blowing for some years, two large and extensive stone-coal furnaces have been erected, within two years, near Milwaukee, by the Milwaukee Iron Company. No. 1 was put in blast in March, 1870, and made in 1871, 17,749 tons. No. 2 was blown in May, 1871, and made in eight months 10,550 tons. The fuel used in these furnaces is about one-fourth coke and three-fourths anthracite coal, and we are informed that it works very well. The product of these works was not included in the make of anthracite iron, but in that of raw bituminous coal and coke iron.

Few states in the Union have greater mineral resources than Missouri, and few are entering with greater zeal upon the work of developing them. Her people, knowing that by way of the great river that washes her eastern boundary, foreign iron can be laid down upon her soil at a cost of but three dollars per ton more than at our seaports, are rapidly becoming strong advocates of the protective policy, without the continuance of which no section of the country would be a greater sufferer.

During the year 1871, Missouri produced 82,685 tons of pig iron, of which 39,935 tons were made with charcoal, and 42,750 tons with stone coal. The present capacity of her furnaces is not less than 125,000 tons per annum. The following statement shows the quantity of pig iron made annually in Missouri for a number of years past :

YEAR.	TONS.	YEAR.	TONS.
1854.....	5,798	1863.....	11,905
1855.....	9,166	1864.....	16,514
1856.....	11,720	1865.....	14,511
1857.....	11,116	1866.....	15,980
1858.....	10,154	1867.....	22,000*
1859.....	15,178	1868.....	33,600
1860.....	20,192	1869.....	51,520
1861.....	19,271	1870.....	81,200
1862.....	9,476	1871.....	82,685

The following is an approximate statement of the quantity of ore mined in Missouri during the last four years :

YEAR.	TONS.
1868.....	117,600
1869.....	218,400
1870.....	353,920
1871.....	268,800

The falling off in 1871 was caused by low water in the Mississippi and Ohio rivers, that prevented shipments, and also by the depression in the furnace business caused by the reduction of the duty from \$9 to \$7 per ton in the latter part of 1870.

Late in the year the first rail mill in Missouri, was put into operation and made in a few months 8,200 tons. The capacity of the mill is about 50,000 tons per annum.

#### GENERAL REMARKS.

Having recently observed in a number of newspapers statements to the effect that large quantities of foreign railroad iron were being imported for the Northern Pacific railroad, and also that several American mills were using old foreign iron in the manufacture of rails for said road, despite the provision in the charter of said company that all the iron used in its construction *must be smelted from American ores*, your secretary addressed Gen. J. Gregory Smith, president of the company, upon the subject, and received a very courteous letter in reply, in which that gentleman said :

"Not a rail of English iron has been imported for or laid on the Northern Pacific road. Not a manufacturer is, to my knowledge, using any foreign iron in the rails manufactured for our road. Every contract that has been made for iron by this company has contained a special covenant on the part of the manufacturer furnishing the iron, that it shall be made from American

\* Estimated.

iron, manufactured from American ores, in strict conformity to the special terms and provisions of our charter. I have taken every precaution possible to insure the fulfillment of this provision of our charter in good faith, and it has been, and is, the policy and intention of the board of directors to comply faithfully with the obligations imposed upon us."

Although the inventive genius of our iron-makers was never, perhaps, more active than during the past two years, yet there are scarcely any inventions to chronicle which have proved to be of great and enduring value.

Processes for making iron and steel by the "short-cut," *i. e.* direct from the ore, have as usual been brought forward by the score, but most, if not all of them, have shared the fate of previous efforts in this field, which has always been an attractive one for inventors.

New fluxes and purifying nostrums have been plentifully patented, but none seem to have met with general favor.

In the line of mechanical puddling, Mr. Danks, of Cincinnati, appears to have achieved a signal success. It is gratifying that the fatal difficulty encountered in the working of rotary puddling machines in Europe, viz.: the construction of the furnace lining, should have been successfully overcome by an American iron-master.

Few improvements of special importance have been made, since our last, in blast furnace practice. No branch of the iron industry in this country, is more important than the production of pure brands of pig iron for steel making. With our abundant, pure iron ores, there would seem to be no reason why we should import English pig iron for the Bessemer process. In some sections this subject is attracting the attention it deserves, but in general it is too much neglected. We cannot hope for a better state of things until a careful classification is made of ores, fluxes and fuels, based upon accurate chemical analyses.

Recent investigations, of which the results are not all yet made public, indicate that ere long blast furnace cinder, which now constitutes a heavy encumbrance, will find important economic applications. Among these may be mentioned its utilization when pulverized as building sand, also in the preparation of hydraulic cement and paving stones. Very favorable results have already been obtained from its use, on the continent of Europe.



The backwardness of the coke industry in the bituminous coke regions, has been frequently commented upon. The introduction of coal washing machines, and of extensive modern coking ovens, already in use in some sections, is much to be desired.

We note the formation of the American Institute of Mining Engineers, which already enrolls among its members many of our most distinguished metallurgists and engineers. At its last meeting, in Troy, N. Y., many valuable papers were read on subjects relating to iron and steel making.

The report of the Treasurer of the Association, will be hereafter submitted. \* \* \* \* \* The balance in his hands has been lessened within a year by several appropriations to kindred organizations that are working hand to hand with us in the performance of our really patriotic duties. An appropriation of \$1,500 was recently made to aid the publication of the admirable work of Dr. William Elder, of this city, entitled, "Questions of the Day—Economic and Social," a copy of which has been sent to each of our members, to each member of Congress, and to a large number of gentlemen throughout the country whose position and attainments give them merited influence in their respective communities. This work is meeting with a great demand in all parts of the country, and its influence among thoughtful persons, who do much to shape public opinion, will undoubtedly be great. Another appropriation of \$1,000 was made within a month to aid in the publication and circulation of the tariff speeches of Hon. William D. Kelley, the able representative and eloquent defender in Congress of the producing interests of the country.

These appropriations were made under the conviction that it is our duty to encourage those who show ability in urging correct and patriotic views upon the vital points of industrial economy.

The facts and figures collated by this Association are much sought for by editors, political economists, members of Congress and others, and the correspondence carried on with them is extensive and laborious. Your secretary has recently prepared a small manuscript book, containing all the statistical information of value bearing upon the production and distribution of iron and steel in this and other countries, and copies have been sent to a number of members of Congress who have expressed a desire for such information. If, therefore, untruthful assertions are



made respecting our interests, through ignorance or malice, we have furnished those who champion the cause of the American rather than the British policy with abundant means for refuting them.

With prices of iron we have nothing to do but merely to record them. It is ours to encourage competition among American manufacturers, who pay American wages and rates of interest for money, by shielding them from that foreign competition which, unchecked, would soon destroy them. When success shall have crowned our efforts, we can look with complacency upon that beneficent and equal rivalry upon our own soil, for our own market, which will bring security, if not high prices, to our manufacturers, and a reliable supply, at fair rates, to the consumers of their products.

Respectfully submitted,

HENRY McALLISTER, Jr.,  
Secretary.

## APPENDIX.

PRODUCTION OF PIG IRON IN THE UNITED STATES, IN TONS  
OF 2,000 POUNDS.

<i>Years.</i>	<i>Anthracite.</i>	<i>Charcoal.</i>	<i>Raw Bitum Coal &amp; Coke</i>	<i>Total.</i>
1854	339,435	342,298	54,485	736,218
1855	381,866	339,922	62,390	784,178
1856	443,113	370,470	69,554	883,137
1857	390,385	330,321	77,451	798,157
1858	361,430	285,313	58,351	705,094
1859	471,745	284,041	84,841	840,627
1860	519,211	278,331	122,228	919,770
1861	409,229	195,278	127,037	731,544
1862	470,315	186,660	130,687	787,662
1863	577,638	212,005	157,961	947,604
1864	684,018	241,853	210,125	1,135,996
1865	479,558	262,342	189,682	931,582
1866	749,367	332,580	268,396	1,350,343
1867	798,638	344,341	318,647	1,461,626
1868	893,000	370,000	340,000	1,603,000
1869	971,150	392,150	553,341	1,916,641
1870	930,000	365,000	570,000	1,865,000
1871	956,608	385,000	570,000	1,912,608

PRODUCTION OF ANTHRACITE PIG IRON IN THE UNITED STATES,  
BY STATES. TONS OF 2,000 POUNDS.

<i>Years.</i>	<i>Mass.</i>	<i>N. York.</i>	<i>N. Jersey.</i>	<i>Penna.</i>	<i>Md.</i>
1854	4,978	35,619	24,372	262,747	11,719
1855	7,181	49,728	32,754	283,836	8,367
1856	3,855	52,826	29,247	347,195	9,990
1857	3,900	46,485	21,785	307,199	11,016
1858	3,390	48,600	16,447	280,685	12,308
1859	1,000	68,282	28,394	364,587	9,482
1860	000	79,529	27,092	403,694	8,896
1861	000	66,793	21,271	314,271	6,894
1862	000	72,702	27,309	370,304	000
1863	000	109,992	27,537	432,062	8,047
1864	2,509	121,863	29,578	519,690	10,378
1865	3,000	80,420	16,195	376,969	2,974
1866	3,606	118,274	40,680	573,759	13,048
1867	3,500	151,586	36,919	594,270	12,363
1868	4,000	160,681	47,209	671,955	9,155
1869	4,200	210,855	54,201	692,739	9,155
1870					
1871	6,525	154,147	67,228	714,700	15,008

PRODUCTION OF RAW BITUMINOUS COAL AND COKE PIG IRON IN  
THE UNITED STATES, BY STATES. IN TONS OF 2,000 POUNDS.

<i>Years.</i>	<i>Penna.</i>	<i>Ohio.</i>	<i>Other States.</i>	<i>Total.</i>
1854	29,941	15,000	9,544	54,485
1855	38,500	15,000	8,890	62,390
1856	46,317	15,000	8,237	69,554
1857	53,803	20,368	3,280	77,451
1858	33,115	22,236	3,000	58,351
1859	48,626	33,215	3,000	84,841
1860	69,748	49,480	3,000	122,228
1861	79,373	45,664	2,000	127,037
1862	65,227	63,460	2,000	130,687
1863	90,719	65,242	2,000	157,961
1864	122,719	86,483	1,923	210,125
1865	116,000	72,006	1,676	189,682
1866	170,000	97,198	1,198	268,396
1867	191,072	126,375	1,200	318,647
1868	194,000	132,000	14,000	340,000
1869				553,341
1870				570,000
1871				570,000

PRODUCTION, IMPORTATION AND TOTAL CONSUMPTION OF RAILS  
IN THE UNITED STATES, IN TONS OF 2,000 POUNDS.

<i>Years.</i>	<i>Made in U. S.</i>	<i>Imported.</i>	<i>Total Consumption.</i>
1849	24,318		
1850	44,083	159,080	203,163
1851	50,603	226,350	276,953
1852	62,478	294,750	357,228
1853	87,864	358,794	446,658
1854	108,016	339,439	447,455
1855	138,674	153,019	291,693
1856	180,018	186,594	366,612
1857	161,918	215,166	377,084
1858	163,712	90,894	254,606
1859	195,454	83,958	279,412
1860	205,038	146,610	351,648
1861	187,818	89,388	279,206
1862	213,912	10,186	224,098
1863	275,768	20,506	296,274
1864	335,369	142,457	477,826
1865	356,292	63,327	419,619
1866	430,778	117,878	548,656
1867	462,108	184,840	646,948
1868	506,714	300,160	806,874
1869	593,586	336,500	930,086
1870	620,000	472,403	1,092,403
1871	775,733	572,386	1,348,119

MONTHLY EXPORTATION OF RAILS FROM GREAT BRITAIN TO THE UNITED STATES, during the years 1869, 1870 and 1871, in tons of 2,000 pounds. Compiled from official returns, published by authority of the House of Commons.

<i>Month.</i>	1869.	1870	1871
January	22,877 tons	27,563 tons	31,462 tons
February	24,576 "	36,912 "	36,912 "
March	44,974 "	26,009 "	46,930 "
April	37,587 "	41,347 "	36,351 "
May	28,638 "	37,266 "	72,177 "
June	29,924 "	51,570 "	50,309 "
July	39,483 "	46,450 "	47,491 "
August	28,617 "	45,981 "	53,752 "
September	16,693 "	37,825 "	60,897 "
October	20,996 "	31,702 "	58,434 "
November	16,732 "	33,106 "	35,815 "
December	25,403 "	56,672 "	41,856 "
Total	336,500 tons	472,403 tons	572,386 tons

QUANTITY OF PIG IRON EXPORTED FROM GREAT BRITAIN TO THE UNITED STATES, annually since 1850, in tons of 2,000 pounds. Compiled from official returns published by authority of the House of Commons.

<i>Year.</i>	<i>Quantity.</i>	<i>Year.</i>	<i>Quantity.</i>
1850	74,874 tons	1861	110,025 tons
1851	67,249 "	1862	22,147 "
1852	91,873 "	1863	31,007 "
1853	114,227 "	1864	102,223 "
1854	160,483 "	1865	44,601 "
1855	98,924 "	1866	108,304 "
1856	59,011 "	1867	134,238 "
1857	51,794 "	1868	96,548 "
1858	41,985 "	1869	148,383 "
1859	72,517 "	1870	126,515 "
1860	71,497 "	1871	210,686 "

PRODUCTION OF ROLLING MILLS IN THE UNITED STATES, IN TONS  
OF 2,000 POUNDS.

<i>Years.</i>	<i>Rails.</i>	<i>Other Rolled Iron.</i>	<i>Total.</i>
1864	335,369 tons	536,958 tons	872,327 tons
1865	356,292 "	500,048 "	856,340 "
1866	430,778 "	595,311 "	1,026,089 "
1867	462,108 "	579,838 "	1,041,946 "
1868	506,714 "	598,286 "	1,105,000 "
1869	593,586 "	642,420 "	1,236,006 "
1870	620,000 "	705,000 "	1,325,000 "
1871	775,733 "	710,000 "	1,485,733 "

PRODUCTION OF THE FORGES AND BLOOMERIES IN THE UNITED  
STATES, IN TONS OF 2,000 POUNDS.

<i>Year.</i>	<i>Quantity.</i>	<i>Year.</i>	<i>Quantity.</i>
1865	63,977 tons	1869	69,500 tons
1866	73,555 "	1870	62,259 "
1867	73,073 "	1871	63,000 "
1868	75,200 "		

PRODUCTION OF STEEL OF ALL KINDS IN THE UNITED STATES, IN  
TONS OF 2,000 POUNDS.

<i>Year.</i>	<i>Quantity.</i>	<i>Year.</i>	<i>Quantity.</i>
1865	15,262 tons	1869	35,200† tons
1866	18,973 "	1870	75,000‡ "
1867	19,000 "	1871	82,000§ "
1868	30,000* "		

\*Including 8,500 tons of Bessemer steel. †Including about 12,000 tons of Bessemer steel. ‡Including about 40,000 tons of Bessemer steel. §Including about 45,000 tons of Bessemer steel.

QUANTITY OF STEEL (not including Steel Rails) EXPORTED FROM GREAT BRITAIN TO THE UNITED STATES, in tons of 2,000 pounds. Compiled from official returns, published by authority of the House of Commons.

<i>Year.</i>	<i>Quantity.</i>	<i>Year.</i>	<i>Quantity.</i>
1865	23,584 tons	1869	18,661 tons
1866	21,308 "	1870	19,921 "
1867	19,086 "	1871	23,695 "
1868	19,272 "		

QUANTITY OF ROLLED IRON, OTHER THAN RAILS, EXPORTED FROM GREAT BRITAIN TO THE UNITED STATES, in tons of 2,000 pounds. Compiled from official returns, published by authority of the House of Commons.

<i>Year.</i>	<i>Quantities. Bar, Angle, Bolt and Rod Iron.</i>	<i>Year.</i>	<i>Quantities. Hoop, Sheet and Boiler Plate.</i>
1866	70,725 tons	1866	34,352 tons
1867	50,978 "	1867	33,256 "
1868	49,329 "	1868	20,653 "
1869	62,807 "	1869	37,233 "
1870	56,602 "	1870	43,925 "
1871	72,017 "	1871	46,477 "

QUANTITY OF RAILS EXPORTED ANNUALLY FROM GREAT BRITAIN TO ALL COUNTRIES, IN TONS OF 2,000 POUNDS.

<i>Year.</i>	<i>Quantities.</i>	<i>Year.</i>	<i>Quantities.</i>
1860	507,858 tons	1866	557,783 tons
1861	422,873 "	1867	650,239 "
1862	448,857 "	1868	653,507 "
1863	500,013 "	1869	1,003,350 "
1864	457,200 "	1870	1,187,337 "
1865	486,427 "	1871	1,096,499 "



THE total quantity of iron ore raised in Great Britain, in the year 1870, amounted to 14,370,654 tons 18 cwt., the estimated value of which was £4,951,220 19s. The following is a general summary of the iron ore produced in 1870, in tons of 2,240 pounds :

Counties, etc.	Quantities.		Value.		
	Tons.	Cwt.	£	s.	d.
Cornwall.....	11,214	4.....	3,216	12	0
Devonshire.....	10,193	17.....	3,487	0	0
Somersetshire.....	19,739	7.....	6,908	0	0
Gloucestershire.....	183,503	9.....	82,576	0	0
Wiltshire.....	101,423	0.....	25,355	15	0
Oxfordshire.....	38,803	17.....	9,700	15	0
Northamptonshire.....	761,248	0.....	190,312	0	0
Lincolnshire.....	248,329	17.....	58,980	5	0
Shropshire.....	337,627	0.....	118,169	9	0
Warwickshire.....	17,500	0.....	6,125	0	0
Staffordshire, North.....	910,134	0.....	318,546	18	0
Do. South.....	450,000	0.....	157,500	0	0
Derbyshire.....	384,865	0.....	134,702	15	0
Lancashire.....	871,938	0.....	653,953	0	0
Cumberland.....	1,221,303	4.....	902,396	4	0
Yorkshire, North Riding.....	4,072,888	1.....	1,022,375	3	0
Do. West Riding.....	307,717	0.....	76,929	5	0
Northumberland and Durham.....	225,332	0.....	68,833	0	0
North Wales.....	59,240	0.....	20,730	0	0
South Wales and Monmouthshire.....	560,055	2.....	196,018	18	0
Scotland.....	3,500,000	0.....	875,000	0	0
Ireland.....	77,600	0.....	19,405	0	0

Total iron ore production of the United

Kingdom.....	14,370,654	18.....	4,951,220	19	0
Total in 1869.....	11,508,525	14.....	3,732,560	12	2
“ 1868.....	10,169,231	10.....	3,196,600	7	1
“ 1867.....	10,021,058	9.....	3,210,098	0	4
“ 1866.....	9,655,012	17.....	3,119,098	19	6

PIG IRON MANUFACTURE.—The total quantity of iron ore raised in the United Kingdom, as stated above, amounted to 14,370,654 tons; beside which there was imported of foreign ores, 208,310 tons, making a total of iron ore smelted in Great Britain of 14,578,964 tons. Value of the iron ores of the United Kingdom, £4,951,220 19s. Number of furnaces in blast, 664.

Pig iron produced:

	Tons.
In England.....	3,735,627
“ Wales.....	1,021,888
“ Scotland.....	1,206,000

Total production of pig iron in Great Britain.....5,963,515

This quantity, estimated at the mean average price at the place of production, would have a value of £14,908,787. In 1869, the quantity was, 5,445,757 tons, and the estimated value, £13,614,397.

PRODUCTION OF PIG IRON IN GREAT BRITAIN, IN TONS OF  
2,240 POUNDS.

<i>Years.</i>	<i>Quantity.</i>	<i>Years.</i>	<i>Quantity.</i>
1800	180,000	1854	3,585,906
1810	294,642	1863	4,510,040
1820	368,000	1865	4,819,254
1830	678,417	1866	
1840	1,500,000	1867	
1845	1,512,500	1868	4,970,206
1850	2,250,000	1869	5,445,757
		1870	5,963,515

PRODUCTION OF PIG IRON IN FRANCE IN TONS OF  
2,240 POUNDS.

<i>Years.</i>	<i>Quantity.</i>	<i>Years.</i>	<i>Quantity.</i>
1818	114,000	1863	1,150,000
1825	195,588	1864	1,166,600
1830	222,965	1865	1,168,300
1835	290,378	1866	1,252,653
1850	406,000	1867	1,222,363
1855	750,000	1868	
1860	896,200	1869	1,380,000

## PRODUCTION OF IRON AND STEEL IN THE GERMAN ZOLLVEREIN, FROM 1860 TO 1869.

Year.	Iron Ore.	Pig Iron.	Raw Steel Iron.	Castings From Ore.	Castings From Pig Iron.	Iron in Bars, &c.	Sheet Iron.	Steel.
	1000 Thaler†... Centner*.	1000 Thaler..... Centner...	1000 Thaler..... Centner...	1000 Thaler..... Centner...	1000 Thaler..... Centner...	1000 Thaler..... Centner...	1000 Thaler..... Centner...	1000 Thaler..... Centner...
1860	28,015,637	2,608	144,187	3,222	7,502	6,702,223	865,688	4,038
1861	36,165,400	2,980	213,700	3,186	9,241	7,084,896	865,094	5,492
1862	44,320,414	3,601	231,454	3,208	9,785	8,263,465	1,056,375	6,181
1863	47,494,909	3,915	447,969	3,614	12,414	8,715,185	1,224,621	7,733
1864	52,400,407	4,321	790,114	3,559	14,490	9,276,708	1,386,006	11,940
1865	60,268,261	5,782	1,011,806	3,260	14,817	9,864,549	1,563,279	16,999
1866	59,920,420	5,714	964,607	2,980	12,818	9,690,883	1,403,596	19,312
1867	65,389,275	6,124	1,497,139	4,111	13,156	10,807,799	1,390,134	19,415
1868	72,687,372	6,463	1,507,679	2,986	13,760	12,291,921	1,829,705	24,215

\*20 Centner=1 ton of 2200 pounds.

†1 Thaler=80.72 Gold, United States.

## PIG IRON PRODUCTION IN THE WORLD IN 1871.

The following is an approximate estimate of the whole production of pig iron in the world in 1871, in tons of 2,000 pounds:

Great Britain.....	6,500,000 tons.
United States.....	1,912,000 "
France.....	1,350,000 "
German Zollverein.....	1,250,000 "
Belgium.....	896,000 "
Austria.....	450,000 "
Norway and Sweden.....	280,000 "
Russia.....	330,000 "
Italy.....	75,000 "
Spain.....	72,000 "
Other countries .....	200,000 "

Total.....13,315,000 "

It will be observed that Great Britain produced about one-half of the pig iron made in the world last year. The number and location of her blast furnaces at present (January 1, 1872) are as follows:

	<i>Built.</i>	<i>In Blast</i>
Cleveland .....	91	89
North-east of England.....	43	35
North-west of England.....	66	61
South Staffordshire.....	166	109
North Staffordshire.....	41	36
Shropshire.....	29	22
Yorkshire—West Riding.....	41	27
Derbyshire.....	45	37
Northampton and Lincoln.....	19	16
Gloucester, Wilts, etc.....	18	12
North Wales.....	12	6
South Wales and Monmouth..	188	120
Scotland.....	154	126
Total.....	913	696

STATEMENT OF THE RATES OF DUTIES ON IRON AND STEEL UNDER THE SEVERAL TARIFF ACTS, FROM JULY 4, 1789, TO FEBRUARY 5, 1816, BOTH INCLUSIVE.

ARTICLES.	Act of July 4, 1789.	Act of Aug. 10, 1790.	Act of May 2, 1792.	Act of June 7, 1794.	Act of May 13, 1800.	Act of Mar. 27, 1804.	Acts of July 1, 1812; Feb. 25, 1813.
Iron, sheets.....	7½ per cent.	7½ per cent.	10 per cent.	15 per cent	Pound, 1½ ct.	Pound, ½ ct.	Pound, 3 cents
Cut, hoop, slit, rolled	7½ per cent.	7½ per cent.	10 per cent.	15 per cent.	Pound, 1 cent	Pound, 1 cent	Pound, 2 cents
Rolled or hammered.....	7½ per cent.	7½ per cent.	10 per cent.	15 per cent.	15 per cent.	17½ per cent	35 per cent.
Cables or chains.....	Cwt., 75 cents	Cwt., \$1.00.	Cwt., \$1.80	Cwt., \$1.80.	Pound, 2 cents	Pound, 2 cents	Pound, 4 cents
Castings, n. o. p*.....	7½ per cent.	7½ per cent.	10 per cent.	15 per cent.	15 per cent	17½ per cent	35 per cent.
Nails .....	Pound, 1 cent	Pound, 1 cent	Pound, 2 cents	Pound, 2 cents	Pound, 2 cents	Pound, 2 cents	Pound, 4 cents
Steel, unwrought.....	Cwt., 56 cents	Cwt., 75 cents	Cwt., \$1 00.	Cwt., \$1.00.	Cwt., \$1.00.	Cwt., \$1.00.	Cwt., \$1.00.

\*Not otherwise provided for.

NOTE.—The tariff act of March 2, 1833, provided, "That from and after the thirty-first day of December, one thousand eight hundred and thirty-three in all cases where duties imposed on foreign imports \* \* \* shall exceed twenty per centum on the value thereof, one-tenth part of such excess shall be deducted: from and after the thirty-first day of December, one thousand eight hundred and thirty-five, another tenth part thereof shall be deducted: from and after the thirty-first day of December, one thousand eight hundred and thirty-seven, another tenth part thereof shall be deducted: from and after the thirty-first day of December, one thousand eight hundred and thirty-nine, another tenth part thereof shall be deducted: and from and after the thirty-first day of December, one thousand eight hundred and forty-one, one-half of the residue of such excess shall be deducted: and from and after the thirtieth day of June, one thousand eight hundred and forty-two, the other half thereof shall be deducted." Thus after the latter date, until the passage of the act of August 30th, 1842, the rates of duties on iron and steel of all kinds were twenty per centum.

STATEMENT OF THE RATES OF DUTIES ON IRON AND STEEL UNDER THE SEVERAL TARIFF ACTS, FROM  
APRIL 27, 1816, TO AUGUST 30, 1842, BOTH INCLUSIVE.

ARTICLES.	<i>Act of April 27, 1816. April 20, 1818.</i>	<i>Act of May 22, 1824.</i>	<i>Act of May 19, 1828.</i>	<i>Act of July 14, 1832.</i>	<i>Act of March 2, 1833. †</i>	<i>Act of August 30, 1842.</i>
Iron, old or scrap.....	.....	.....	.....	Ton.....\$12.50	Ton.....\$12.50	Ton.....\$10.00
Pig.....	Cwt.....50	Cwt.....50	Cwt.....62½	Cwt.....50	Cwt.....50	Ton.....\$6.00
Sheets.....	Cwt.....\$2.50	Pound...3	Pound...3½	Pound...3	Pound...3	Pound...2½
Cut, hoop, slit, rolled.	Cwt.....\$2.50	Pound...3	Pound...3½	Pound...3	Pound...3	Pound...2½
Roller or hammered	.....	.....	.....	.....	.....	.....
band.....	30 per cent.....	Pound...3	Pound...3	Pound...3	Pound...3	Pound...2½
Round or square.....	.....	Pound...3	Pound...3½	Pound...3	Pound...3	Pound...2½
Nail or spike rods.....	.....	Pound...3	Pound...3	Pound...3	Pound...3	Pound...2½
Bars or bolts, not man-	.....	.....	.....	.....	.....	.....
ufactured, whole or	.....	.....	.....	.....	.....	.....
part by rolling.....	Cwt...45 & 75c.	Cwt...90	Pound...1	Cwt...90	Cwt...90	Ton.....\$17.00
Bars and bolts wholly	.....	.....	.....	.....	.....	.....
or part by rolling...	Cwt.....\$1.50	Cwt.....\$1.50	Ton.....\$37.00	Ton.....\$30.00	Ton.....\$30.00	Ton.....\$25.00
Cables or chains.....	Pound...3	Pound...3	Pound...3	Pound...3	Pound...3	Pound...2½
Railroad.....	.....	.....	Pound...1	Pound...1	Pound...1	Pound...2½
All other n. o. p. ....	20 per cent.....	25 per cent.....	25 per cent.....	25 per cent.....	24 p. ct. in 1836	30 per cent.....
Steel, unwrought.....	Cwt.....\$1.00	Cwt.....\$1.00	Cwt.....\$1.50	Cwt.....\$1.50	Cwt.....\$1.50	.....
Cast, shear or German	.....	.....	.....	.....	.....	.....
in bars.....	.....	.....	.....	.....	.....	Cwt.....\$1.50
All others in bars.....	.....	.....	.....	.....	.....	Cwt.....\$2.50
Manufacturers, n. o. p.	20 per cent.....	25 per cent.....	25 per cent.....	25 per cent.....	23 p. ct. in 1841	.....

\*By Act of September, 1841, the rate was made 20 per cent.  
†By Act of September, 1841, the rate was lowered to 23 per cent.

†See NOTE on page 12.

STATEMENT OF THE RATES DUTIES ON IRON AND STEEL UNDER THE SEVERAL TARIFF ACTS FROM  
JULY 30, 1846, TO DECEMBER 22, 1870, BOTH INCLUSIVE.

ARTICLES.	Act of July 30, 1846.	Act of March 3, 1857.	Act of March 2, 1861.	Act of Dec. 24, 1861.	Act of July 14, 1862.	Acts of June 30, 1864; March 3, 1865.	Act of July 14, 1870.
	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8 Ton ..... \$9	Ton ..... \$6 Ton ..... \$6 Ton ..... \$7
Iron, old scrap.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Cast.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Wrought.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$9	Ton ..... \$7
Pig.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
In bars, blooms, bolts, loops, rods, slabs, (more advanced than pig, less than bars), or other form.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Bars, rolled or hammered, n. o. p., including flats not less than 1 inch nor more than 7 inches wide, nor less than $\frac{1}{4}$ inch nor more than 2 inches thick, and rounds less than $\frac{1}{4}$ inch or more than 4 inches diameter, and squares not less than $\frac{1}{2}$ inch nor more than 4 inches square.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Ditto, including flats not less than 1 nor more than 7 inches wide, $\frac{1}{4}$ to 2 inches thick, value under \$50 per ton.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Ditto, including flats not less than 1 nor more than 7 inches wide, $\frac{1}{4}$ to 2 inches thick, value over \$50 per ton.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Ditto, rolled or hammered, comprising flats less than 7 inches wide, rounds less than $\frac{1}{4}$ inch or more than 4 inches in diameter, and squares less than $\frac{1}{2}$ inch or more than 4 inches square.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6
Ditto, including flats not less than 1 inch nor more than 6 inches wide, nor less than $\frac{1}{4}$ inch nor more than 2 inches thick, and rounds not less than $\frac{1}{4}$ inch, nor more than 2 inches in diameter, and squares not less than $\frac{1}{4}$ inch nor more than 2 inches square.....	30 per cent.....	24 per cent.....	Ton ..... \$6	Ton ..... \$6	Ton ..... \$6	Ton ..... \$8	Ton ..... \$6

Pound, 1 cent. Pound, 1 cent.

STATEMENT OF THE RATES OF DUTIES ON IRON AND STEEL UNDER THE SEVERAL TARIFF ACTS, FROM  
JULY 30, 1846, TO DECEMBER 22, 1870, BOTH INCLUSIVE.

ARTICLES.	Act of July 30, 1846.	Act of March 3, 1857.	Act of March 2, 1861.	Act of July 14, 1862.	Acts of June 30, 1864, Mar. 3, 1865.	Act of Mar. 22, 1867.
<b>Iron, continued.</b>						
Bars, including flats less than $\frac{3}{4}$ inch and not above 2 inches thick, nor less than 1 inch or more than 6 inches wide, rounds less than $\frac{3}{4}$ inch or more than 2 inches in diameter, and squares less than $\frac{3}{4}$ inch or more than 2 inches square.....					Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Other descriptions of rolled or hammered, n. o. p.....					Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Bars, for railroads, or inclined planes, and fitted to pattern and fitted to be laid down, not above 6 inches high.....					Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Band, hoop, slit and rolled or hammered (1862), and scroll, from $\frac{1}{4}$ inch to 6 inches wide, not below $\frac{1}{4}$ inch thick, (1864).....					100 lbs 60 & 70c	100 lbs 70 cts..
Ditto, from $\frac{1}{4}$ inch to 6 inches wide, less than $\frac{1}{4}$ inch thick, not less than No. 20 wire gauge.....	30 per cent....	24 per cent....	Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Ditto, thinner than No. 20 wire gauge.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Iron, boiler, and other plate.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Not less than 3-16 inch thick.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Rods, nail or spike, slit, rolled or hammered.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Sheet, smooth or polished, all.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Galvanized, or coated with zinc.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Other, common or black, not thinner than No. 20 wire-gauge.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Thinner than No. 20, not thinner than No. 25.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts
Thinner than No. 25.....			Ton.....\$20	Ton.....\$25	Pound... $1\frac{1}{2}$ cts	Pound... $1\frac{1}{2}$ cts



STATEMENT OF THE RATES OF DUTIES ON IRON AND STEEL UNDER THE SEVERAL TARIFF ACTS FROM  
JULY 30, 1846, TO DECEMBER 22, 1870, BOTH INCLUSIVE.

ARTICLES.	Act of					Acts of		Act of		Act of	
	July 30, 1846.	March 3, 1857.	March 2, 1861.	July 14, 1862.	June 30, 1864.	March 3, 1865.	July 14, 1870.				
Steel, manufactured, n. o. p.	30 per cent.	15 per cent.									
In ingots, bars, coils and sheets.	15 per cent.		Pound, 1½ cents	Pound, 1½ cents	Pound, 2½ cents	Pound, 2½ cents	Pound, 2½ cents				
Valued at 7 cents or less, per pound.			Pound, 2 cents.	Pound, 2½ cents	Pound, 3 cents.	Pound, 3 cents.	Pound, 3 cents.				
Valued at above 7 cents, not above 11 cents per pound.			30 per cent.	25 per cent.	30 per cent.	30 per cent.	30 per cent.				
Valued at above 11 cents per pound.			Pound, 1½ cents	Pound, 1½ cents	Pound, 2½ cents	Pound, 2½ cents	Pound, 2½ cents				
In any other form, n. o. p.											
Wire, not less than ¼ inch in diameter, valued at 7 cents or less per pound.											
Valued at above 7 cents, not above 11 cents per pound.											
Valued at above 11 cents per pound.											
Less than ¼ inch in diameter, not less than No. 16 wire gauge.											
Less or finer than No. 16.											
Crimoline, corset, and hat wire.											
All, n. o. p.											
Railway bars.											
Part steel.											
Squares.											
Manufacturers of, n. o. p.	30 per cent.	24 per cent.	30 per cent.	35 per cent.	30 per cent.	30 per cent.	35 per cent.				



## ANNUAL REPORT OF THE SECRETARY.

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*The report herewith submitted embraces the year 1872 and the larger part of the year 1873. It is proposed to supplement it at an early day with additional information for both years, but especially for 1873.*

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### GENERAL REVIEW OF THE IRON TRADE.

The year 1871 was one of general activity in the iron business of Great Britain and the United States. With the close of the Franco-Prussian war in the summer of this year, the European demand for iron, to repair the waste of the war, to compensate for decreased iron production during its continuance, and to facilitate railroad construction, very greatly increased. Another cause of the increased European demand for iron in 1871 was the extensive substitution by European nations of iron ships for those of wood, and the tendency in various other industries besides ship-building to put iron to new uses. The demand from all causes was fed by the abundant capital which had been let loose at the close of the war, and now sought investment. In the United States the fever for building railroads, added to some of the causes enumerated above as influencing the European market, produced an extraordinary demand for iron in 1871. We built over 7,000 miles of railroad in that year, and we needed iron for ships, bridges, architectural work, and all the other purposes to which an inventive and prosperous people could adapt it. The unprecedented demand for iron, from all quarters, inured largely and immediately to the benefit of British ironmasters, whose furnaces and rolling mills were stimulated to their utmost capacity. Neither the Continental nations nor the United States could supply their own home demand. Prices at once advanced in the British market.

With the increased activity during 1871 in the British iron trade and in other British industries, came an increase in the cost of coal for manufacturing and other purposes, the colliery proprietors advancing the price because of the shortness of stocks and the increased demand for their product. The rise in iron began in the latter part of 1871, and the rise in coal during the following winter. Simultaneously with these advances, the British coal and ironstone miners and the ironworkers renewed the agitation for an advance in wages, and they were generally successful. The result was inevitable. The colliery proprietors still further advanced the price of coal, and the ironmasters still further advanced the price of iron. The close of 1871 found stocks of pig and finished iron reduced in Great Britain, although production had been increased during the year, while orders for the new year were far more numerous than had been usual at the close of previous years. In the United States the year closed with a buoyant tendency and prices considerably enhanced over those which ruled during the preceding spring months.

The year 1872 opened with an increased demand for iron in nearly all civilized countries. Prices advanced rapidly in all markets. The supply was unequal to the demand, although production was everywhere stimulated. In the United States forty new blast furnaces were erected, and the erection of others was undertaken—the foreign demand for British iron and the increased cost of producing that iron leading to the reasonable presumption that our people would now be able to possess their own iron markets. The rapidity with which iron rose in price in the United States is shown in the following average quotations of sales of No. 1 pig iron at Philadelphia during the years 1871 and 1872:

	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1871.....	60 50	30 90	34 75	35 37	33 50	35 50	35 75	36 25	37 00	37 20	37 50	37 50
1872.....	37 50	40 00	43 50	48 50	49 00	50 25	51 50	52 00	53 00	52 50	50 00	45 00

The average monthly prices of English rails at New York, in gold, duty paid, were as follows during 1871 and 1872:

	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1871.....	55	54½	55½	56½	55½	56	56½	57	57	57½	58	58
1872.....	58½	62½	65	72½	75½	73½	72½	72½	75½	76½	72½	71

From Mr. Henry Rylett, editor of *Rylands' Iron Trade Circular*, we have received the following quotations of monthly prices of British iron during 1871 and 1872, and the first six months of 1873, which show how remarkable was the rise in that market. They have been politely furnished at our request:

1871.	Jan.	Feb.	Mar.	April.	May.	June.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig-iron, Scotch.....	2 16 0	2 16 0	2 16 0	2 18 6	2 19 3	2 19 6
Pig-iron, Cleveland.....	2 9 6	2 9 6	2 9 6	2 9 6	2 9 6	2 9 6
Bar-iron, Staffordshire.....	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0
Sheets, singles.....	9 10 0	9 10 0	9 10 0	9 10 0	9 10 0	9 10 0
Hoops.....	8 15 0	8 15 0	8 15 0	8 15 0	8 15 0	8 15 0
Rails, Welsh.....	7 5 0	6 5 0	6 5 0	6 10 0	6 10 0	6 10 0
Rails, North of England...	6 2 6	6 2 6	6 2 6	6 15 0	6 15 0	6 15 0

1871.	July.	August.	Sept.	Oct.	Nov.	Dec.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig-iron, Scotch.....	2 19 6	3 3 6	3 6 6	3 5 0	3 6 6	3 12 0
Pig-iron, Cleveland.....	2 9 6	2 9 6	2 9 6	2 9 6	2 16 6	2 19 6
Bar-iron, Staffordshire.....	8 0 0	8 0 0	8 10 0	8 10 0	8 10 0	9 0 0
Sheets, singles.....	9 10 0	9 10 0	10 0 0	10 0 0	10 0 0	10 10 0
Hoops.....	8 15 0	8 15 0	9 10 0	9 10 0	9 10 0	10 0 0
Rails, Welsh.....	6 15 0	6 15 0	6 15 0	6 15 0	6 15 0	7 0 0
Rails, North of England...	6 15 0	6 15 0	6 15 0	6 15 0	7 5 0	8 0 0

1872.	Jan.	Feb.	Mar.	April.	May.	June.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig-iron, Scotch.....	3 13 0	3 16 6	3 18 0	4 10 0	4 13 9	4 15 0
Pig-iron, Cleveland.....	3 5 0	3 14 0	3 17 6	4 10 0	5 0 0	5 5 0
Bar-iron, Staffordshire.....	10 0 0	11 0 0	12 0 0	12 0 0	12 0 0	12 10 0
Sheets, singles.....	11 15 0	12 15 0	13 0 0	14 10 0	16 0 0	16 10 0
Hoops.....	10 10 0	11 10 0	12 0 0	13 0 0	13 10 0	14 0 0
Rails, Welsh.....	8 15 0	9 0 0	9 0 0	10 0 0	10 10 0	10 10 0
Rails, North of England...	8 5 0	9 0 0	9 5 0	10 0 0	10 10 0	10 10 0

1872.	July.	August.	Sept.	Oct.	Nov.	Dec.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig-iron, Scotch.....	5 17 6	6 11 0	6 10 9	6 5 3	5 15 0	4 12 6
Pig-iron, Cleveland.....	5 10 0	5 15 0	6 0 0	6 0 0	6 0 0	5 0 0
Bar-iron, Staffordshire.....	14 10 0	15 10 0	15 10 0	13 10 0	11 10 0	11 10 0
Sheets, singles.....	19 10 0	21 0 0	21 0 0	18 0 0	17 0 0	14 10 0
Hoops.....	16 0 0	17 0 0	17 0 0	14 0 0	13 0 0	13 10 0
Rails, Welsh.....	10 15 0	10 15 0	11 0 0	11 0 0	11 0 0	10 0 0
Rails, North of England...	11 0 0	11 0 0	11 0 0	11 0 0	11 0 0	10 5 0

1873.	Jan.	Feb.	Mar.	April.	May.	June.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig-iron, Scotch.....	6 5 0	6 16 0	7 3 0	6 0 0	6 0 0	5 16 3
Pig-iron, Cleveland.....	5 10 0	6 0 0	6 0 0	6 0 0	6 0 0	6 0 0
Bar-iron, Staffordshire.....	12 0 0	13 0 0	15 0 0	15 0 0	15 0 0	15 0 0
Sheets, singles.....	17 0 0	18 0 0	20 0 0	20 0 0	20 0 0	20 0 0
Hoops.....	14 0 0	15 0 0	17 0 0	17 0 0	17 0 0	17 0 0
Rails, Welsh.....	10 15 0	10 15 0	11 0 0	12 0 0	12 0 0	11 10 0
Rails, North of England...	11 10 0	12 0 0	13 5 0	13 15 0	13 15 0	13 0 0

Since July prices have receded somewhat from those given above for first six months of 1873.

The following table, compiled from authentic data, shows the average prices of English bars for the last sixty years:

	£	s.	d.		£	s.	d.		£	s.	d.
1806.....	17	0	0	1826.....	9	15	10	1846.....	9	13	4
1807.....	16	0	0	1827.....	9	7	6	1847.....	9	13	4
1808.....	14	10	0	1828.....	7	18	4	1848.....	6	12	6
1809.....	15	0	0	1829.....	6	16	8	1849.....	5	17	6
1810.....	14	10	0	1830.....	6	3	9	1851.....	6	0	0
1811.....	14	0	0	1831.....	5	13	9	1853.....	11	0	0
1812.....	13	10	0	1832.....	5	13	4	1854.....	10	0	0
1813.....	13	6	8	1833.....	6	12	11	1855.....	11	0	0
1814.....	13	18	4	1834.....	6	18	9	1856.....	9	0	0
1815.....	13	13	4	1835.....	6	10	0	1858.....	8	0	0
1816.....	12	2	6	1836.....	10	12	6	1859.....	7	10	0
1817.....	10	12	6	1837.....	9	1	3	1862.....	7	0	0
1818.....	12	1	8	1838.....	9	4	7	1864.....	9	10	0
1819.....	12	5	0	1839.....	9	15	0	1865.....	8	10	0
1820.....	10	13	4	1840.....	8	7	6	1867.....	7	10	0
1821.....	8	18	4	1841.....	7	5	0	1869.....	7	0	0
1822.....	8	1	3	1842.....	5	17	6	1870.....	8	0	0
1823.....	8	0	0	1843.....	5	2	6	1871.....	8	10	0
1824.....	8	19	2	1844.....	6	2	6	1872.....	14	0	0
1825.....	12	14	2	1845.....	9	5	0	1873 (July).....	14	0	0

Until 1872, the price had not reached £14 since the year 1825. In the latter year the highest price reached was £15. The average price during the last twenty years has been a trifle over £8 per ton; so that present rates are even yet fully £5 to £6 over that average.

The prices at which coal has been sold in Great Britain during 1872 and 1873 have shown an advance fully as great as in the prices of iron. For the first five months of 1871 the average price per ton of coal exported was 9s. 5d., and for the same period of 1873, £1. 1s. 4d.—an advance of 126 per cent. The selling price of coal at the pit's mouth, at the Lochgelly Iron and Coal Works, Fifeshire, in 1868, was 5s. 6½d. per ton; in 1869, 4s. 6½d.; in 1870, 4s. 0½d.; in 1871, 4s. 3d.; in 1872, 9s. 10d.; and in July, 1873, 13s. The average price of six qualities of coal at the pit's mouth at the Manston collieries, in West Yorkshire, in 1871, was 5s. 8d.; in 1872, 9s. 3d.; and in 1873, 13s. 1d. The average wholesale price of best household coal in London, in 1869, was 18s. 8d.; in 1870, 18s. 6d.; in 1871, 19s. 3d.; in 1872, 24s., and in 1873, up to June, 32s. 6d. The maximum price received was 45s. Retail prices to consumers were much higher.

The rise in the price of coke in the North of England iron district is given by Mr. I. Lowthian Bell as follows: "In September, 1871, forge pig iron was selling with us for 50s., and coke was sell-

ing at from 10s. to 12s. a ton; pig iron rose gradually toward the end of the year to 64s., but coke was not affected up to that time. In January, 1872, pig iron rose from 64s. to 70s. 6d., and coke rose to 20s. In March, forge pig iron was 84s., and coke was 25s. In April, the pig iron rose to 94s, and the coke rose to 32s. 6d. In July, the forge pig iron rose to 110s., more than twice what it was in 1871, nine months before; and the coke rose to 37s. 6d. and 41s. per ton."

The total yield of the coal fields of Great Britain during the last few years was as follows: 1870, 110,289,722 tons; 1871, 117,186,278 tons; 1872, according to the evidence given before a select committee of the House of Commons, 123,386,758 tons.

According to the report of the "royal commissioners appointed to inquire into matters relating to coal," every thousand tons of coal raised in Great Britain is used as follows:

In paper making and tanning.....	6
smelting copper, lead, tin, and zinc.....	8
water works.....	14
breweries and distilleries.....	18
chemical manufactures.....	19
railway work.....	20
steam navigation.....	30
articles of clay and glass, and lime kilns.....	31
textile fabrics—of wool, cotton, silk, flax and jute.....	42
gas works.....	60
mining operations.....	67
coal exported to foreign countries.....	92
general purposes, chiefly steam engines.....	121
domestic use.....	172
iron and steel works, inclusive of that required for their steam power.....	300

The iron industry consumes nearly one-third of the total output. The select committee already alluded to estimates that, of the 123,386,758 tons of coal raised in 1872, the iron industry consumed 38,228,875 tons. The dependence of this important branch of British manufactures upon the coal supply will be appreciated at a glance. The closeness with which the prosperity of the coal interest of Great Britain is linked with that of the iron interest will also not escape notice.

Strenuous efforts have been made in England to reduce the price of coal, but thus far with but little success. The lowest price at which coke was sold at Middlesbrough, early in October last, was 32s. 6d. In the same month coal at London brought 30s. to 34s. As long as there is a fair demand for British iron, the high price of British coal will be maintained; when the demand from

this source slackens, coal must decline. The demand from the United States for British iron has almost ceased during the past few months: let this diminution in orders extend to other countries which are leading purchasers, and the high prices of British coal and iron will immediately recede to figures approximating those which prevailed three years ago. In such a contingency, which is extremely probable, England would again be able to send to this country *cheap iron*.

Statistics of the production of British iron and steel for 1872 are very meagre. About 400,000 tons of Bessemer steel were converted during the year. There were in operation about 700 blast furnaces, and 7,000 puddling furnaces. Twenty-one blast furnaces are now in course of erection in the North of England. The following figures show the production, shipments, &c., of pig iron in Scotland, and in the Cleveland district, for a series of years, in gross tons:

CLEVELAND DISTRICT.			
	1867.	1868.	1869.
Annual production.....	1,148,000	1,233,000	1,460,000
Total shipments.....	136,378	136,806	185,777
Stock, 31st Dec.....	171,400	152,900	115,600
	1870.	1871.	1872.
Annual production.....	1,695,000	1,884,000	1,969,000
Total shipments.....	216,908	330,646	386,624
Stock, 31st Dec.....	117,345	68,331	41,628
Furnaces in blast, 31st Dec.....			130
SCOTLAND.			
	1861.	1862.	1863.
Annual production.....	1,035,000	1,080,000	1,160,000
Total shipments and home consumption.....	927,000	970,000	1,105,000
Stock, 31st Dec.....	535,000	645,000	756,000
Furnaces in blast, 31st Dec.....	121	125	134
	1864.	1865.	1866.
Annual production.....	1,160,000	1,164,000	994,000
Total shipments and home consumption.....	1,156,000	1,272,000	1,136,000
Stock, 31st Dec.....	760,000	652,000	510,000
Furnaces in blast, 31st Dec.....	134	136	98
	1867.	1868.	1869.
Annual production.....	1,031,000	1,068,000	1,150,000
Total shipments and home consumption.....	1,068,000	973,000	1,098,000
Stock, 31st Dec.....	473,000	568,000	620,000
Furnaces in blast, 31st Dec.....	112	121	129
Average price for the year.....	52s. 6d.	54s. 3d.	57s. 9d.
	1870.	1871.	1872.
Annual production.....	1,206,000	1,160,000	1,090,000
Total shipments and home consumption.....	1,161,000	1,335,000	1,386,000
Stock, 31st Dec.....	665,000	490,000	194,000
Furnaces in blast, 31st Dec.....	126	126	115
Average price for the year.....	51s. 3d.	73s.	121s.

It will be observed that the total consumption of Scotch pig iron has steadily increased since 1861, while the production was



only a few tons greater in 1872 than in 1861. The stock on hand, which was greatly reduced in 1872, has been still further reduced in 1873.

The total production of pig iron in Great Britain, in gross tons, since 1867, was as follows: 1867, 4,761,023; 1868, 4,970,206; 1869, 5,445,757; 1870, 5,963,515; 1871, 6,627,179; 1872, 6,723,387. In 1862 the production was about 4,000,000 tons. Mr. I. Lowthian Bell has estimated that, at the rate of increase which has existed since 1862, the production of pig iron in Great Britain ought to reach 11,500,000 tons in 1882, and that, to meet this production and the probable extension of British malleable iron works, something like 65,000,000 tons of coal would be required, or more than one-half the total production of coal in 1872.

The total production of bar iron and steel in Great Britain in 1869 was 4,734,145 gross tons; in 1871 it was 5,566,175 tons.

The total exports from Great Britain of iron and steel and manufactures thereof during 1871, 1872, and first nine months of 1873, were as follows: 1871, tons, 3,169,219; value, £32,090,175: 1872, tons, 3,388,622; value, £44,259,639: 1873, first nine months, tons, 2,296,990; value, £36,541,278. First nine months of 1872, tons, 2,602,883; value, £32,188,231.

The high prices which have ruled for British iron during the past two years have stimulated iron production on the Continent of Europe as well as in this country. To such an extent has the development of the iron industry of the Continent progressed that Belgian, French and German iron makers are now formidable competitors with England in almost all the European iron markets, and the intelligent Sheffield correspondent of the *New York Iron Age* states it to be a fact within his own knowledge that a Belgian firm is now supplying both bridge girders and girders for buildings to English contractors at a lower price than they could be purchased in England. In August last the Belgian government received proposals for 12,000 tons of steel rails, and the successful bidders were Messrs. Schneider & Co., of Le Creuzot, France, beating both English and Belgian competitors. During the same month eighty lots of five hundred tons each of Bessemer steel rails were secured by the Bochum Works of Westphalia, their offer being lower than the offers of

English and other railmakers. It must be remarked, however, that the high price of coal in France, Germany and Belgium has of late interfered seriously with the production and consumption of iron on the Continent, temporarily retarding the growth of an industry which all European countries now see the need of encouraging.

From such trustworthy sources of information as have been accessible, the following information concerning the progress of the iron and steel industries of the Continent during late years has been condensed. We have consulted especially the *Bulletin du Comité des Forges de France*, for June, 1873; the *Zeitschrift für das Berg-Hütten und Salinen-Wesen in dem Preussischen Staate*, (1872); and the *Journal of the Iron and Steel Institute*, (1873.)

The comparative table below shows in tons of 2,000 pounds the production of iron and steel in France during the year 1869, which preceded the commencement of the war with Prussia, and the year 1872, the first year after the war during which the French people felt encouraged to resume with vigor the arts of peace. The exhibit for 1872 does not, of course, include the production of the lost provinces of Alsace and Lorraine. It is estimated that the production of iron and steel in France will not be so great in 1873 as in 1872, owing to the restriction of consumption caused by high prices.

ITEMS TABULATED.	1869.	1872.	Increase.	Decrease.
<b>Pig IRON :</b>				
Foundry, net tons.....	271,617	191,188	.....	80,429
Forge " " .....	1,266,734	1,108,202	.....	158,532
Total " " .....	1,538,351	1,299,390	.....	238,961
<b>WROUGHT IRON :</b>				
Rails, net tons.....	237,158	140,882	.....	96,776
Sheet iron, net tons.....	115,723	147,086	31,363	.....
All other kinds, net tons.....	757,428	683,921	.....	73,507
Total, " " .....	1,110,309	971,889	.....	138,920
<b>STEEL :</b>				
Bessemer rails, net tons.....	.....	73,705	.....	.....
" bars, angle, sheets and plates, net tons.....	.....	22,877	.....	.....
Total, net tons.....	.....	96,582	.....	.....
<b>MARTIN-STEEL, CAST, PUDDLED, ETC :</b>				
Rails, net tons.....	.....	16,850	.....	.....
Bars, angle, sheets and plates, net tons.....	.....	38,977	.....	.....
Total, net tons.....	.....	55,827	.....	.....
Grand total, steel.....	.....	152,409	.....	.....

In 1865 there were in blast in France 121 coke furnaces and 208 charcoal furnaces; in 1872 there were in blast 113 coke furnaces, and 115 charcoal furnaces. In 1865 the coke furnaces yielded 224,453 gross tons, and the charcoal furnaces 377,376 tons; total, 601,829 tons.

The statistics of Prussian iron and steel production in 1872 are wanting. It is known, however, that the greatest activity prevailed throughout the empire in that year. The annexed table shows the production in 1870 and 1871, in tons of 2,000 pounds.

ITEMS TABULATED.	1870.	1871.	Increase.	Decrease.
Blast furnaces, } In.....	245	263	18	
} Out.....	99	73		26
PRODUCTION OF FURNACES:				
Pig and scrap iron, net tons.....	1,235,765	1,292,881	57,116	
Castings, " ".....	35,385	35,053		332
Total, " ".....	1,271,150	1,327,934	56,784	
Coke pig-iron, " ".....	1,156,290	1,229,960	73,670	
Charcoal pig iron, " ".....	76,055	73,066		2,989
Charcoal and coke pig-iron, net tons.....	38,804	24,907		13,897
PRODUCTION OF WROUGHT IRON:				
With coal, net tons.....	675,103	714,025	38,922	
With charcoal, net tons.....	15,586	22,031	6,445	
Total, net tons.....	690,689	736,056	45,367	
Sheet iron, net tons.....	88,946	101,309	12,363	
Wire, " ".....	46,415	60,008	13,593	
Sum of all, " ".....	826,050	897,273	71,223	
PRODUCTION OF STEEL:				
Pig-iron for the direct production of steel, net tons.....	153,413	160,856	7,443	
Crude steel, including Bessemer:				
With coal, net tons.....	34,116	35,923	1,807	
With charcoal, net tons.....	1,181	2,618	1,437	
Total, net tons.....	35,297	38,541	3,244	
Cast steel, net tons.....	132,573	162,983	30,410	
Refined steel, net tons.....	5,823	9,843	4,020	

The value of these products for the years named was as follows:

PRODUCT.	Value in 1870. (Gold.) U. S. Money.	Value in 1871. (Gold.) U. S. Money.	Value per net ton in 1870. (Gold.)	Value per net ton in 1871. (Gold.)	Increase per net ton in 1871. (Gold.)
Pig-iron.....	\$17,328,808 62	\$20,557,751 27	\$16 00	\$18 32	\$2 32
Pig-iron for steel.....	2,802,127 17	3,808,218 37	18 27	23 68	5 41
Castings.....	11,434,127 97	14,619,876 57	43 90	47 01	3 11
Wrought iron, rails, &c.....	27,698,867 87	32,514,035 12	40 09	43 55	3 46
Sheet-iron.....	4,533,962 22	5,613,611 70	50 96	55 76	4 80
Wire.....	2,461,559 97	3,303,805 42	53 16	55 24	2 08

In July last the official tables of the Austrian iron trade for five periods were published, a summary of which is below. A very large increase in consumption is shown in 1870 and 1871, and an important gain in production in 1871.

The course of the Belgian iron trade for the last three years is given in the following table, in metrical tons. A metrical ton is equivalent to 2,200 pounds.

The importation of iron into Belgium is mainly of pig from England, and the importation of iron ore is principally from Germany and France. Germany is the principal customer of Belgium for finished iron; after which come the Netherlands, England, France, the United States, Russia, Turkey, and Austria, in the order named. The exports to the United States in 1870 were 119,243 metrical tons; in 1871, 197,611 tons; in 1872, 219,545 tons. In 1872 the coal product of Belgium was 14,000,000 tons of

2,240 pounds. The Danks puddler and Louth's three-high rolls have been successfully introduced into Belgium this year.

Sweden has been greatly benefited by the increase in iron consumption during the past few years. The superiority of its iron is well known. The following statistics show the production, in gross tons, of iron and steel and iron ore in the five years ending with 1871 :

	1867.	1868.	1869.	1870.	1871.
Iron ore from mines.....	475,076	524,768	580,027	604,511	697,316
Iron ore from the lakes.....	17,434	11,007	6,134	13,476	15,449
Cast iron.....	248,522	257,884	286,356	294,319	292,850
Wrought iron.....	167,098	168,617	176,068	189,972	183,989
Steel and manufactured iron.....	22,413	25,202	31,304	32,343	34,888

There were two hundred and seven blast furnaces in operation in Sweden in 1871, producing an average of about four tons each daily. The quantity of ore exported in 1871 was 11,660 gross tons. The export of pig iron amounted to 40,000 tons. In 1872 the production and exportation of Swedish iron were much greater than in 1871. Below is a list of home prices, per gross ton, of Swedish charcoal pig iron during the last eleven years :

	£ s. d.		£ s. d.		£ s. d.
1863.....	4 00 0	1867.....	3 16 0	1871.....	3 12 0
1864.....	3 19 0	1868.....	3 15 0	1872.....	5 15 0
1865.....	3 19 0	1869.....	3 13 0	1873 (July).....	9 00 0
1866.....	3 19 0	1870.....	3 10 0		

Since 1871 the prices of Swedish ore and charcoal have kept pace with the advance in iron.

The iron resources of Russia are but little understood in this country, but from such statistics as have met our notice it is clear that they are of great value. The Russian railway system is very extensive, and this and other forms of national enterprise, which annually demand a large supply of iron, furnish a strong inducement to embark in its manufacture. This manufacture is now encouraged by a wise governmental policy, and its healthy development can not long be delayed. At the Vienna Exposition the display of Russian iron products was very creditable, and embraced nearly every branch of iron manufacture. There are now three rail rolling mills in Russia. One of these mills produces 40,000 tons

of rails annually. The number of blast furnaces in operation in 1870 was two hundred and forty-five, and the number of other iron and steel works was two hundred and fourteen. There is an abundance of excellent ore in Russia, and recent discoveries have established the existence of extensive coal fields, at least one of which is anthracite. Companies have been formed to develop this coal supply and to diminish the importation of foreign coal. The production of cast iron in the Ural district of Russia in the decade ending with 1867 was 201,303 gross tons, and of wrought iron, 129,380 tons.

In Italy the manufacture of iron is a weak and struggling industry. The country possesses ore of good quality, but there has heretofore been a scarcity of fuel. There is a prospect, however, that this want will soon be supplied, owing to recent discoveries of bituminous coal. From 1867 to 1870 the average annual production of iron ore, and cast and wrought iron, in the kingdom, was as follows:

Iron ore exported to other countries.....	32,800	gross tons.
Iron ore smelted in Italy.....	22,500	" "
Cast iron produced in Italy.....	11,000	" "
Wrought iron from Italian pig iron.....	9,000	" "
Wrought iron from foreign pig iron.....	10,000	" "

Spain might manufacture iron largely if it would, but its people prefer to buy their iron abroad and send away their rich iron ore. Since the close of 1869 the manufacture of iron in Spain has been on the decline. Mr. J. Jooris, the Belgian Minister *ad interim* to the Spanish Republic, reports to his government the causes of this decline. He says: "Three causes have been instrumental in bringing about this deplorable result: one, high coal; two, high wages; and three, *duty free import for railroad purposes*." The manufacture of steel has also declined. The shipments of iron ore to Great Britain alone amounted to several hundred thousand tons in 1872. In exact figures, the export of ore to Great Britain has increased from 88,000 tons in 1868 to 631,000 tons in 1872. In addition to British requirements, there is a constant and large demand for Spanish ore from Germany, France and Belgium. In the early part of 1873 the shipments increased, but since then the civil dissensions of the country have interfered with the working of the principal mines.

Throughout the Continent much interest is manifested in the increase of the supply of coal for manufacturing purposes, and it is to be expected that Russia, Austria, Sweden, and some other nations will make much progress in this direction within the next few years.

The iron ore mines of Algeria are being worked with much energy by French and English capitalists. The ore is generally of the richest quality, and much of it is adapted to the manufacture of Bessemer pig. The same is true of most of the Spanish ore. England imported 55,000 tons of Algerian ore from one mine during the first eleven months of 1872. The total quantity of ore exported from Algeria to all countries during the four years from 1867 to 1870 was 800,000 tons. France imported 155,608 tons in 1871. The production of ore in 1872 was 334,924 tons. There are no blast furnaces in Algeria, but it is proposed to begin their erection, and, in the absence of native fuel of all kinds, to use coal which may be taken by steamers as return cargoes. It has been found to be profitable to ship Algerian ore to the United States, a cargo having been received at New York last summer. It was purchased by Cooper, Hewitt & Co. and the Bethlehem Iron Company. A small cargo of Spanish ore from Bilbao was bought during the present year by the Pennsylvania Steel Company, which analyzed about fifty-three per cent., and proved to be every way of excellent quality.

Iron ore is found in Australia, Tasmania, and New Zealand, and, as either bituminous coal or charcoal may also be obtained, local and English capitalists are giving attention to the feasibility of establishing iron works in these countries.

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## PRESENT CONDITION OF THE IRON TRADE.

The high prices for iron of all descriptions which had prevailed in the United States in 1872 gradually declined during the latter part of that year, and this decline, with some effort at a rally in January, continued during 1873. It was not sufficient, however, to restrict production, jeopardize the interests of producers, or compel



a reduction of wages. The causes of the decline may be found, first, in the natural tendency of high prices to restrict consumption, and thus bring about sharper competition; and, second, in the forced subsidence at the close of 1872 of the fever for building Western railroads. Owing to these combined causes, the demand for rails and other railway material fell off greatly at the close of 1872, while in some other branches of business, usually requiring large supplies of iron, consumption was considerably curtailed at the same period. This condition of business—restricted consumption and gradually declining prices; with foreign competition still existing, and a tendency in some iron districts to accumulate stocks of pig iron—prevailed on the 18th of September, when the present financial crisis commenced by the suspension of a leading banking house largely interested in railroad securities. This crisis has deranged the whole business of the country. The prices of iron have still further declined, reaching in some lines of the trade to a point far below the cost of production. The blow has been severely felt. At the beginning of November the quoted prices of raw and manufactured iron were almost as low as at the beginning of 1871, before the rise commenced; the price of rails was fully as low; while the demand for iron for railroad construction, cars, car wheels, locomotives, iron railroad bridges, and every branch of manufactures dependent upon railroad patronage had almost ceased. At the date mentioned, the prices asked for four leading articles of American iron manufacture were as follows: Bessemer rails, at mill, \$110; iron rails, at mill, \$68; best No. 1 anthracite pig iron, at Philadelphia, \$36; merchant bars, at Pittsburgh, 3 cents. From cash buyers even lower rates than these would readily have been accepted. English iron rails were sold at New York at \$60, gold. On the 17th of September, the day before the occurrence of the crisis, the above-mentioned articles were quoted as follows: American Bessemer rails, \$120; iron rails, \$75; No. 1 pig iron, at Philadelphia, \$42; merchant bars, at Pittsburgh, 3½ cents; English iron rails at New York, \$65, gold. The average decline since September has been fully 15 per cent., with few sales transpiring, and they mostly in small lots for immediate use.

At the beginning of November many blast furnaces, bar mills,



and rail mills were idle. After a careful survey of the whole field, we are satisfied that fully *one-third* of our furnaces were then out of blast, and that by the close of the month *one-half* of all the furnaces will be blown out. Stocks of pig iron are accumulating in many districts, for which there is no sale at any price. Most of the bar and rail mills that are now running are working on short time. Rail mills especially are bare of orders, with no immediate prospect of a change for the better. The plate mills are more favored. Thousands of ironworkers, at the beginning of winter, are out of employment, while a large proportion of those who are yet employed have accepted a reduction of wages averaging 15 per cent. The mining of iron ore has sympathized with the prostration of the iron trade.

The financier or the philosopher who would undertake to predict when the above described state of the iron trade and its adjuncts will assume a more favorable aspect would be a bold man, and would likely win for himself the reputation of being a false prophet. The crisis, however, and the conditions which preceded it, have produced one result which will reach into the immediate future, and which all men may easily comprehend: the home production of all kinds of iron will be equal to the home demand, under any circumstances, for some time to come.

With prices beaten down to the lowest possible cost of production; with many thousands of ironworkers and miners out of employment, and thousands of others working at reduced wages; with idle furnaces, and rolling-mills, and foundries in every iron district and manufacturing city of the country; with large stocks of unsold iron in almost every iron market, it is a proper time to consider whether it is wise longer to encourage the importation of foreign iron by continuing the reduction of duties which Congress has twice authorized during the past four years. This reduction, it has been abundantly proved, did not reduce the cost of iron to consumers, while the Government lost the revenue on imported iron to the amount of the reduction. If the reduction is continued, encouragement is thus given to the foreign ironmaker at a time when his American competitor is driven to the wall by a combination of adverse circumstances, not the least of which is the fact

that, owing partly to this reduction, the foreign ironmaker has, within the past twelve months, sent to our shores many shiploads of iron which could have been as cheaply made in our own country. But for the heavy importations of foreign iron after the demand for American iron had commenced to slacken, there would be more general activity in the American iron trade to-day, and employers and employes would be in better heart. The aggregate value of our importations of iron and steel, and manufactures thereof, during the twelve months which ended on the 30th of June last, was *fifty-nine millions of dollars*. We now see that these importations were not needed, and have done immense harm to the home iron trade and all dependent upon it. An increase of the duty on pig iron from \$6.30 to \$9 a ton, and proportionally upon other classes of iron and steel, would be a wise measure of relief for Congress to enact immediately after it assembles. Better reduced revenue for the Treasury, than cold and hunger in the homes of American workmen.

Relative to the present condition of the British iron trade, it may briefly be remarked that our financial difficulties add another to the many advantages possessed by British ironmasters for manufacturing cheap iron. The reduction of wages, and the stoppage of many of our iron works, will operate as a check to the emigration of miners and ironworkers from England, Scotland, and Wales, and will to this extent enable British ironmasters and colliery owners to reduce the wages of their workmen, when they shall find it necessary to do so. It may further be remarked of the present condition of the British iron trade, that it shows every indication that it will be as bold, as energetic, and as aggressive in the future as in the past. Little faith should be placed in the theory that the coal supply of the United Kingdom will at any time within a century be unequal to any demand that may be made upon it for manufacturing purposes. The only question connected with the fuel supply, about which British ironmasters need concern themselves, is the price at which fuel shall be furnished. Let it once become absolutely necessary that this price shall be reduced, and reduced it will be, either by a diminution of the present enormous profits of the colliery owners, or by a reduction of

the wages of the colliers. But if coal should not materially decline in price, so as to cheapen the cost of British iron, there yet remains to the British ironmaster the alternative of reducing his own princely profits rather than let them elude his grasp altogether. In a desperate struggle for the possession of the trade they now respectively hold, the colliery proprietors and the ironmasters can reduce all wages and their own profits, and thus give iron to the world almost as cheap as it was three years ago. Such a contingency is not now improbable, and may come at any time within the next few months. A financial crisis in England and on the Continent like that through which this country is now passing would precipitate such a struggle. But if not precipitated in this way, the inability or unwillingness, from any cause, of Continental nations to continue to take from Great Britain the large supplies of iron they have of late required, would most certainly result in a strong reaction in the prices of British iron. *The British iron trade has already commenced to decline.* Rylands' *Iron Trade Circular* for October 11th states that the official returns of foreign exports for the month of September show that of iron and steel of all descriptions there were exported 265,793 tons, value £3,465,586, as against 300,508 tons, value £3,623,325, in September of last year, or a decline of over eleven per cent. in quantity and more than four and one-half per cent in value. The decline is largely from Germany, where a reaction from the speculation of the last two years has undoubtedly commenced. The same well-informed and influential journal declares, in the same issue, that "in ordinary times" British ironmasters have little to fear from American competition; meaning by "ordinary times" a period of low prices. We are not yet done with British competition in our own iron markets.

The Middlesbrough *Iron and Coal Trades Review* of October 29th remarks that, "the state of the money market and the generally unsettled character of the principal Continental exchanges have caused the iron trade to be comparatively dull of late." It quotes pig iron as "easier in price," inquiries for finished iron "less numerous," the coal trade "not quite so active as it was a month ago," and "a general expectation of lower prices" among consumers.

## THE INCREASE IN OUR EXPORT IRON TRADE.

From Hon. Edward Young, Chief of the Bureau of Statistics of the Treasury Department, we have received the following summary statement of the exports of iron and steel and manufactures thereof from the United States during the fiscal years which ended June 30, 1871, 1872, and 1873—all the articles enumerated being the production of the United States :

COMMODITIES—QUANTITIES.	1871.	1872.	1873.
<b>IRON, AND MANUFACTURES OF:</b>			
Pig.....cwt.	70,853	40,528	56,327
Bar.....cwt.	3,638	735	6,162
Boiler-plate.....cwt.	523	966	742
Railroad bars and rails.....cwt.	4,410	1,734	25,391
Sheet, band and hoop.....cwt.	772	2,505	1,187
Castings not specified.....			
Car-wheels.....No.	2,317	4,760	7,515
Stoves and parts of.....			
Steam engines, locomotive.....No.	38	72	58
Steam engines, stationary.....No.	29	42	46
Boilers, separate from engines.....			
Machinery not specified.....			
Nails and spikes.....lbs.	5,006,774	4,449,279	5,996,913
All other manufactures of iron.....			
<b>STEEL AND MANUFACTURES OF:</b>			
Ingots, bars, sheets, and wire.....lbs.	16,205	65,935	18,849
Cutlery.....			
Edge tools.....			
Files and saws.....			
Muskets, pistols, rifles, sporting guns.....			
Manufactures of steel not specified.....			
COMMODITIES—VALUES.	1871.	1872.	1873.
<b>IRON, AND MANUFACTURES OF:</b>			
Pig.....	\$111,033	\$69,331	\$140,683
Bar.....	16,754	4,532	33,767
Boiler plate.....	3,096	8,047	4,589
Railroad bars and rails.....	17,445	7,167	104,054
Sheet, band, and hoop.....	4,810	13,030	6,088
Castings not specified.....	105,044	128,017	153,234
Car-wheels.....	42,761	99,826	137,458
Stoves and parts of.....	72,152	92,337	115,792
Steam engines, locomotive.....	536,746	953,881	952,655
Steam engines, stationary.....	55,720	118,312	111,507
Boilers, separate from engines.....	54,532	178,520	232,546
Machinery not specified.....	1,515,843	2,499,744	3,120,984
Nails and spikes.....	259,324	241,429	356,990
All other manufactures of iron.....	2,020,271	2,398,210	3,262,170
<b>STEEL AND MANUFACTURES OF:</b>			
Ingots, bars, sheets, and wire.....	2,538	8,146	3,955
Cutlery.....	114,142	68,030	47,346
Edge tools.....	424,821	577,613	846,452
Files and saws.....	9,282	16,894	10,171
Muskets, pistols, rifles, sporting guns.....	13,463,916	1,037,117	1,181,869
Manufactures of steel not specified.....	174,850	236,733	297,541
Total values.....	\$19,005,990	\$3,747,106	\$11,119,831

Omitting "muskets, pistols, rifles, and sporting-guns," the trade in which during the fiscal year which ended June 30, 1871, was greatly stimulated by the Franco-Prussian war, our exports of the above named commodities showed a gratifying increase in the fiscal year 1872 over 1871, and a still further increase in 1873 over 1872. The most noticeable increase in the iron exports of the fiscal year 1873 over 1872 is in bar iron and railroad bars. Our export trade in railroad bars, by countries, for the calendar years 1871 and 1872 was as follows :

COUNTRIES.	1871.		1872.	
	Cwt.	Dollars.	Cwt	Dollars.
Canada.....			6,520	\$23,450
Cuba.....	1,000	\$ 3,750	10,761	45,631
Brazil.....	4,251	18,269	1,629	6,938
Mexico .....	218	1,111	145	649
England .....			60	150
United States of Colombia....			324	1,972
Venezuela.....			3,696	14,190
Total. ....	5,469	\$23,130	23,135	\$92,980

Of the exports for the fiscal year which ended on the thirtieth of June last, we are furnished the following details by the Bureau of Statistics, in advance of the publication of the Commerce and Navigation Report for the year named. The pig iron was shipped as follows : To Canada and British North American Possessions, 50,946 cwts.; to all other countries, 5,381 cwts.; none to the British Islands. The bar iron as follows : To Canada etc., 101 cwts.; to all other countries, 6,061 cwts. The boiler plate, 742 cwts., was all shipped to Canada and the British North American Possessions. The railroad bars and rails as follows : To Canada, etc., 6,520 cwts.; to all other countries, 18,871 cwts. The sheet, band and hoop as follows : To Canada, etc., 70 cwts.; to all other countries, 1,117 cwts.

We have emphasized the statement that no pig iron was shipped during the last fiscal year to the British Islands, because various statements have appeared in the public prints setting forth that such shipments were made. The *Marquette Mining Journal*, however, in its issue for October 9th, states that from 1,200

to 1,500 tons of Lake Superior charcoal iron have been shipped this year to Glasgow and Liverpool. It adds: "There are now strong inquiries from abroad for Lake Superior pig iron. English iron merchants are now in correspondence with our furnacemen with a view of arranging for direct shipments next year."

There should be nothing surprising in the fact that No. 1 charcoal pig iron has been shipped from Lake Superior to Great Britain. Iron of this quality is essentially necessary in the manufacture of certain iron products, but, owing to the cutting down of some of their forests, and the absorption of others by the gentry, England and Scotland now manufacture but a small quantity. It is stated that there is but one charcoal furnace now in blast in Great Britain. Swedish charcoal pig iron is now exceptionally high in price. English and Scotch founders have of late made some advances toward the adoption of the American method of making car-wheels, which requires charcoal pig iron of the best quality. It may be possible that these founders will hereafter require a part of our product for this purpose. But this demand would be entirely exceptional, and could not be regarded as at all affecting the general proposition that this country can not compete with the United Kingdom in its own markets for its own iron supply. We think it more probable that the Lake Superior pig iron which has been taken to England has been purchased at a loss, with the view of inducing the makers of Swedish pig iron to lower their prices.

It has also been alleged that American bar iron has been shipped to England this year and sold at a profit at prices lower than English-made iron of like quality could be afforded. The circumstantial statement has been telegraphed from London that one hundred tons of American bar iron were sold at Liverpool on September 15th, at £11 10s. per ton, delivered, "thus underselling the English market," which then ruled at £11 15s. It had previously been announced in the New York journals that Messrs. Jackson & Chase of that city had accepted an order from Liverpool for one hundred tons of merchant bar iron. The coincidence in these statements led to the inference that the alleged sale in Liverpool related to the order given to Jackson & Chase, and subsequent developments have established the correctness of that inference. In the *Liverpool Daily Post* of

September 18th, Messrs. W. S. & N. Caine, of that city, published a statement of all the facts relating to the alleged sale, from which we learn that the order to Messrs. Jackson & Chase emanated from them, and was induced by representations that it could be filled at lower prices than were then ruling in Liverpool for English iron of the same quality. On the morning of the day the Messrs. Caine addressed their communication to the *Daily Post*, the gentleman who had solicited from them the order received a letter from his principals, Messrs. Jackson & Chase, of which the following extract was embodied by the Messrs. Caine in their statement, putting an end to all discussion of the subject:

"NEW YORK, September 6.

"Your letter dated 21st ult. duly received, and we have delayed reply to see if we could meet your figures. Although prices are low with us, and we are anxious to fill an order for your market, yet it could not be done at £11 10s. without some loss. We regret not being able to execute your order, but will keep you advised of the probabilities of being able to meet your views. There has been no small stir in our city since it came out that we got an order from England for 100 tons of iron. All sorts of rumors have been flying about, and the newspapers got hold of it, and there has been much discussion on the subject. While we would be pleased to make such a shipment, we do not anticipate being able to do so unless prices are maintained on your side and go down on this. It is not to be expected that the condition of the trade should hold so that any extensive shipments could be made to England for some time to come. But your people should not forget that ours is a remarkable country in the matter of resources for iron production, and the home competition will keep the prices at reasonable figures in the absence of any extraordinary demand, and such we have not now by considerable."

We have been thus particular in presenting the true story of the alleged shipments of pig iron and bar iron from this country to England, because the opponents of the protective policy have energetically insisted that, if our iron manufacturers can sell iron in England at a profit, they no longer need to be protected against foreign competition. The exact truth is that, with the exception noted, the cost of making pig iron and bar iron in England is so much lower than in this country that the English ironmaster is not only able to retain command of his own home market for these commodities, but also is enabled, notwithstanding our protective duties, to maintain a vigorous hold upon the American market. Repeal these duties, and his hold upon our market would be strengthened by just the measure of the gratuity thus offered to



him. What we should strive first to accomplish is the absolute possession of our own markets for *all* kinds of pig and manufactured iron. Until that day arrives, no occasional shipments we might make of these commodities to England, to subserve any ulterior purposes of English ironmasters, or to meet a special want of English car-wheel or other manufacturers, could with any show of reason be entitled to be regarded as the establishment of an export iron trade with England.

There is no part of our iron export trade that more significantly expresses our progress in the manufacture of machinery, than the figures given relating to locomotives. To have sent abroad in the three fiscal years 1871, 1872, and 1873, no less than one hundred and sixty-eight locomotives, aggregating in value more than two millions and a half of dollars, is a proud achievement, when viewed in connection with the energetic European competition with which we had to contend. Presuming that it would interest the readers of this report to learn the destination of the locomotives which have been exported, we have applied to the proprietors of the Baldwin Locomotive Works, of Philadelphia, the principal exporters of American locomotives, for a statement showing the number built by them during 1872 and 1873 for foreign countries. The statement is subjoined. It will be observed that the exports of this firm for the calendar year 1873 show a large increase over the total exports of locomotives for the fiscal year 1873.

1872.		1873.	
PERU.—Ilo and Moquegua Railway.....	3	CANADA.—Grand Trunk Railway.....	45
CANADA.—Canada Southern Railway.....	16	Canada Southern Railway.....	13
Great Western of Canada.....	10	Hamilton & Lake Erie Railway... 2	
RUSSIA.—Voronej-Rostaff Railway.....	10	Great Western of Canada Railway 5	
BRAZIL.—Campos & San Sebastião Railway, 1		BRAZIL.—Campos & San Sebastião Railway.. 2	
FINLAND.—Hango Railway.....	4	Don Pedro II.....	20
Total foreign engines 1872.....	44	MEXICO.—Vera Cruz and Mexico Railway... 2	
Value of Locomotives (44) exported by Baldwin Locomotive Works, 1872, \$568,096 94, U. S. currency.		NEW BRUNSWICK.—Government Railways... 1	
		FINLAND.—Hango Railway.....	5
		PRINCE EDWARD ISLAND.—Schreiber & Burpee, (contractors).....	4
		Total, 1873.....	99
		Value of Locomotives (99) exported by Baldwin Locomotive Works, 1873, \$1,432,800 27, U. S. currency.	

## RECAPITULATION.

	Numbers.	Value in U. S. currency.
Locomotives exported by B. L. W. 1872.....	44	\$568,096 94
1873.....	99	1,432,800 27
Total for 1872 and 1873.....	143	\$2,000,897 21



The preponderance of locomotives manufactured for Canada, by the Baldwin Locomotive Works, will not escape notice. Our Canadian iron trade has rapidly increased during the past few years, and this increase is a subject of anxious concern to our English rivals. The *London Times*, of July 29th last, remarks that "the increasing competition of the American iron dealers with those of England is plainly shown in Canada, where American railway iron is delivered at prices fifteen to twenty per cent. below those of Staffordshire." It mentions an order for fifteen thousand axles, "which, under ordinary circumstances, would have gone to England, but which, on account of the cheapness, was given to a manufacturer in the United States." We quote from the *Boston Advertiser* the subjoined statistics of the Canadian trade and navigation returns for the year ending June 30, 1872, exhibiting the value of hardware imported from the United States, as compared with the value of that imported from all other countries into the four old provinces of Canada :

Articles.	From U. States.	From other countries.
Cutlery .....	\$ 64,624	\$ 244,869
Britannia and metal ware.....	19,034	6,657
Spades, shovels, hoes, &c.....	50,773	29,640
Spikes, nails, &c.....	41,544	71,205
Stoves and other castings.....	149,735	121,249
Other hardware. ....	1,293,568	1,727,049
Total.....	\$1,619,278	\$2,200,669

These figures show that the United States possessed in the year named forty-two per cent. of the hardware trade of Canada.

The West Indies, Mexico, Central America, South America, and the British North American Possessions now offer to the United States a market for the sale of manufactures of iron and steel the value of which is incalculable. The enhanced cost of labor and coal to English manufacturers conspires with our recent rapid progress in the use of labor-saving machinery, our great natural resources, and the cheapness of our fuel to place us on terms of decided advantage in competing for the iron trade of these countries. With proper exertion, and the exercise of a disposition to buy liberally from them of what they have to sell, their iron trade will fall largely into our hands. We should not neglect our op-

portunity. It is high time that our iron and steel makers should look to the increase of our foreign markets for iron and steel. Soon the West will be practically self-sustaining in the supply of its own iron and machinery. The South is also making gratifying progress in the development of its iron and manufacturing resources. These two sections have heretofore constituted a ready market for the sale of most of the surplus iron products of the Eastern and Middle States. Hereafter they will not only supply themselves very largely, but they will have iron and its products to sell to others. The continued prosperity of the American iron trade, it will therefore be seen, depends greatly upon the extension of our foreign markets.

The United States, by the adoption of a fiscal policy which has stimulated invention, has been enabled to compete in the markets of the world with the cheap labor of other countries *in the supply of finished products*. By the substitution of improved mechanical appliances for high-priced hand labor, they have obtained better results than countries which have depended mainly upon cheap labor and ruder machinery. Boston exports boots and shoes made by machinery to countries which do not pay their boot and shoe makers one-half the wages her workmen are paid. The *London Times* admits that, as a result of our superior machinery, "railway fastenings, door locks, spring bars, curry-combs, tin wares, and some descriptions of edge tools are among the classes of produce in which American competition is beginning to be seriously felt in Birmingham and the South Staffordshire district." Tailors' shears are regularly exported from this country to England. American axes, made by the Douglas Company, are exported to Dublin and sold at a profit. The Ames shovel is sold in all the markets of the world. American cutlery and hardware are supplanting English cutlery and hardware in many foreign markets, and competing with them in all. Our exports of the products of our labor-saving machinery are every year increasing to Canada, South America, Mexico, New Zealand, Australia, and other countries. We place our high-priced labor against the low-priced labor of manufacturing and commercial rivals, and we win from them a part of their trade because of our superior skill and ingenuity. With all her boasted

superiority, England uses to-day, in many of her manufactures, tools and machinery far inferior to American inventions which meet similar requirements.

The question may be asked, How does protection stimulate invention? The answer would seem to be, that protection directly tends to an increase of wages; high wages increase the cost of production; increased cost of production leads to the substitution of machinery for hand labor, and the demand for machinery that shall be labor-saving quickens the inventive faculties of mechanics and others. The extensive use of machinery enables the country which pays high wages to compete successfully with those countries which pay low wages and use but little machinery. It is also true that, the greater the mechanical resources of a nation, the greater will be the competition between its own artisans for the supply of the home market, and the less will be the tendency to the creation of monopolies and high prices for manufactured products.

In the use of improved machinery, which enables us to supply our own markets and to export our finished products to other countries, lies our great strength as a manufacturing nation. It would be no jewel in our crown—nothing to be proud of—if we were to send pig iron to England and sell it at a profit, for we did that once before, more than a hundred years ago, but it is a present and a lasting glory for American manufacturers that they have become large exporters to England and to other countries of wares and fabrics which have required skill and ingenuity in their production, while the workmen that produced them have been paid the highest wages the world has ever known. We need only to keep on as we have commenced, and, by maintaining our present comparatively high rates of wages, which attract the skilled labor of other lands, and by still further improving our machinery, we will in a brief time become the first among the nations in the exportation of finished products, the only exportation which adds to the strength, culture, and permanent prosperity of a people.

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## OUR IMPORTS OF IRON AND STEEL.

From the same source from which we have received the statistics of our exports of iron and steel for the last three fiscal years, we have received the following figures representing our imports of these commodities during the same periods. It should always be remembered that the fiscal year ends on the 30th of June.

COMMODITIES—QUANTITIES.	1873.	1872.	1871.
<b>IRON AND STEEL, AND MANUFACTURES OF:</b>			
Pig-iron.....lbs...	482,711,889	554,465,164	399,031,453
Castings.....lbs...	729,680	866,285	4,406,073
Bar-iron.....lbs...	166,016,035	236,454,061	203,503,170
Boiler-iron.....lbs...	1,174,165	1,401,951	1,098,838
Band hoop, and scroll iron.....lbs...	25,660,711	23,416,191	22,441,187
Railroad bars or rails, of iron.....lbs...	481,009,481	944,730,303	1,026,045,340
Sheet-iron.....lbs...	29,887,746	29,509,665	20,977,572
Old and scrap iron.....tons...	204,078	230,763	155,805
Hardware.....			
Anchors, cables, and chains, of all kinds.....lbs...	11,599,462	11,010,613	11,050,088
Machinery.....			
Muskets, pistols, rifles, and sporting-guns.....			
Steel ingots, bars, sheets, and wire.....			
f Railroad bars or rails, of steel.....lbs...	320,083,100	245,911,554	
Cutlery.....			
Files.....			
Saws and tools.....			
Other manufactures of iron and steel not elsewhere specified.....			

f Previous to July 1, 1871, reported under some more general class.

COMMODITIES—VALUES.	1873.	1872.	1871.
<b>IRON AND STEEL, MANUFACTURES OF:</b>			
Pig-iron.....	\$7,203,769	\$5,122,318	\$3,106,490
Castings.....	32,113	34,333	32,679
Bar-iron.....	5,288,481	5,153,472	4,068,126
Boiler-iron.....	55,030	67,392	31,284
Band hoop, and scroll iron.....	846,973	573,457	506,501
Railroad bars or rails, of iron.....	10,541,036	15,778,941	17,360,297
Sheet-iron.....	1,287,072	1,116,200	610,809
Old and scrap iron.....	6,643,512	6,040,678	3,782,526
Hardware.....	371,518	204,992	141,495
Anchors, cables, and chains, of all kinds.....	675,184	490,275	472,782
Machinery.....	1,693,966	1,054,045	907,371
Muskets pistols, rifles, and sporting-guns.....	822,119	711,858	706,988
Steel ingots, bars, sheets, and wire.....	4,155,234	4,033,508	3,750,702
f Railroad bars or rails, of steel.....	9,199,666	6,277,694	
Cutlery.....	2,234,347	2,143,708	1,956,351
Files.....	770,986	583,058	604,153
Saws and tools.....	265,637	542,377	514,346
Other manufactures of iron and steel not elsewhere specified.....	7,221,745	5,621,882	4,883,075
<b>Total values.....</b>	<b>\$59,308,388</b>	<b>\$55,540,188</b>	<b>\$43,425,975</b>

f Previous to July 1, 1871, reported under some more general class.

There was an increase of the quantity and value of our imports in the fiscal year 1872 over 1871, but in the fiscal year 1873 the

tide turned, owing to high prices abroad, and, although there was an increase in value over 1872, there was a very great decrease in quantity. This decrease was most marked in the latter half of the fiscal year 1873, continuing up to the close of September last, as will be seen by the following table of exports of iron from Great Britain to the United States during the first nine months of the calendar years 1872 and 1873: tons of 2,240 pounds.

ARTICLES.	QUANTITIES.		VALUES.	
	1872.	1873.	1872.	1873.
	Tons.	Tons	£	£
Pig-iron.....	168,933	87,958	861,816	595,478
Bar, angle, bolt and rod.....	53,599	21,958	590,709	292,332
Railroad of all sorts.....	378,053	151,972	3,737,493	1,967,872
Hoops, sheets and plates.....	25,551	16,913	342,253	275,855
Cast or wrought.....	9,969	13,828	214,470	286,742
Steel, unwrought.....	17,506	15,173	552,685	552,767
Total.....	653,611	307,802	£6,299,426	£3,971,046

The decrease in the quantity of iron and steel imported from Great Britain during the first nine months of 1873, compared with the same period of 1872, was 345,809 tons; the decrease in value was £2,328,380. The decrease in tonnage was fifty-three per cent.; in value, thirty-seven per cent. For the remaining three months of the current year, there is every reason to believe that the decrease in our iron and steel imports will be still more rapid than during the first nine months.

The figures given in the preceding table have been compiled from the Report of the British Board of Trade for September last, and relate only to iron and steel in their coarser forms. It is in these forms, however, that most of our imports are made. In the table which gives our iron and steel imports for the past three fiscal years, it will be observed that our imports of iron and steel in their more finished forms are also given. In response to our request, the Chief of the Bureau of Statistics of the Treasury Department has sent us the following table, showing our iron and steel imports from all countries during the calendar years 1871 and 1872.

IRON AND STEEL, AND MANUFACTURES THEREOF.	1872.		1871.	
	QUANTITIES.	DOLLARS.	QUANTITIES.	DOLLARS.
Pig-iron.....lbs...	591,934,780	\$7,269,850	491,070,514	\$3,797,298
Castings.....lbs...	814,265	38,564	883,140	28,200
Bar-iron.....lbs...	179,152,436	4,837,532	245,131,870	5,024,186
Boiler-iron.....lbs...	1,369,138	59,993	1,465,550	27,351
Band, hoop, and scroll iron.....lbs...	24,759,754	748,509	26,196,088	694,166
Railroad bars or rails of iron.....lbs...	762,128,379	14,498,012	1,132,403,518	{ 19,132,361
"    "    "    steel.....lbs...	299,571,265	8,207,613		
Sheet-iron.....lbs...	20,298,100	1,263,112	24,095,785	857,895
Old and scrap iron.....tons...	248,444	7,617,463	196,732	4,845,092
Anchors, cables, chains, of all kinds.....lbs...	11,751,141	622,908	10,848,838	460,116
Hardware.....		325,268	134,427	134,427
Firearms.....		811,872		599,388
Steel ingots, bars and wire.....		4,106,087		3,460,735
Cutlery.....		2,272,467		2,081,750
Files.....		676,814		595,839
Saws and tools.....		476,927		695,275
Other manufactures not specified..		6,743,183		5,615,589
Total imports.....		60,575,514		47,919,928

In the appendix to this report will be found a table showing the total exports of iron and steel from Great Britain to all countries during 1871, 1872, and first nine months of 1873. In this table will be found the items of British exports to the United States in the periods named.

The importation of old rails from England and other countries is of recent origin, very few having been imported prior to 1867. Below is a table of monthly prices of double-headed rails from that year to the present time, based upon sales made at Philadelphia by Edward Samuel and Edward J. Etting, iron commission merchants. "T" rails fifty cents per ton less.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1867 Currency.....	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1868 ".....				47 00					48 50	49 00		
1869 ".....									49 50	48 00	48 00	
1870 Gold.....	36 00	37 00	37 50	39 00	39 00	39 50	39 50	39 50	39 50	39 50	39 50	39 50
1871 ".....	39 25	39 00	39 25	40 00	40 25	40 25	39 75	39 75	39 50	39 50	39 75	40 00
1872 ".....	42 00	44 50	48 50	52 00	53 00	50 50	50 50	51 50	57 00	48 25	46 50	46 50
1873 ".....	49 00	49 50	52 00	50 25	46 50	46 00	44 25	44 25	44 00	40 50		

# PRODUCTION OF RAILS IN THE UNITED STATES.

The total number of net tons of iron and steel rails made in the United States in 1872, as reported to this office by the makers, is 941,992, or 841,064 gross tons. This aggregate was produced in the following States, the production of which is given in comparison with the production in 1871 :

STATES.	1871.	1872.	Per cent. of total for 1872.
Pennsylvania.....	335,604	419,529	44.53
Ohio.....	75,782	121,923	12.94
Illinois.....	91,178	106,916	11.35
New York.....	87,022	82,457	8.75
Wisconsin.....	28,774	37,284	3.95
Massachusetts.....	28,864	29,242	3.14
Maryland.....	44,941	26,472	2.81
Indiana.....	12,778	23,893	2.53
West Virginia.....	5,000	20,100	2.13
Missouri.....	8,200	15,500	1.65
Tennessee.....	9,667	14,620	1.55
Maine.....	13,383	14,058	1.49
Michigan.....	14,000	9,883	1.04
New Jersey.....	6,700	9,185	.98
Georgia.....	7,840	6,930	.74
Kentucky.....	6,000	4,000	.42
Total.....	775,733	941,992	100.00

This aggregate of production includes only such rails as are made for the use of freight and passenger railways, and excludes an ascertained production of 15,000 tons of street rails, and all mining rails made during the year. Adding these to the above aggregate, the total production of rails of all sorts in the United States in 1872 was undoubtedly *one million net tons*. More mining rails are made by bar mills than by rail mills, and they are frequently classified as bar iron ; hence the impossibility of ascertaining exactly the production of this class of rails in any year. Were the fact otherwise, however, we but follow the precedent of this office in excluding from our tabulated statistics of rails any estimate of the production of mining rails, as well as the ascertained production of street rails.

By this table it will be observed that, in 1872, Pennsylvania

made 419,529 tons, or 44½ per cent. of the whole. Ohio comes second in the list, taking the place which Illinois held in 1871. Illinois is the third State in the list, and New York the fourth. In the production of steel rails, the relative position of these four great iron producing States is almost the same—Pennsylvania producing 38,463 tons; Ohio, 22,000 tons; Illinois, 15,930 tons; and New York, 17,677 tons; total, 94,070 net tons. No other States made Bessemer rails in 1872. The largest production of both iron and steel rails by a single mill must be credited to the Cambria Iron Works, at Johnstown, Pa., which made a total of 81,006 net tons. This magnificent result was accomplished during a year in which a large part of the works was destroyed by fire—a calamity which it is proper to state, however, was almost immediately overcome by the extraordinary energy and resources of the Company.

The following table exhibits the production of rails in the United States from 1849 to 1872, inclusive, together with the growth of the railway system of the country during the same period:

YEARS.	Total Rails made in United States. Tons of 2,000 lbs.	Total Rails im- ported. Tons of 2,000 lbs.	Total Consump- tion of Iron and Steel Rails.	Miles of Railroad built in U. States in each year.
1849	24,318	69,163	93,481	1,369
1850	44,083	159,080	203,163	1,656
1851	50,603	226,350	276,953	1,961
1852	62,478	294,750	357,228	1,926
1853	87,864	358,794	446,658	2,452
1854	108,016	339,439	447,455	1,360
1855	138,674	153,019	291,693	1,654
1856	180,018	186,594	366,612	3,643
1857	161,918	215,166	377,084	2,486
1858	163,712	90,894	254,606	2,465
1859	195,454	83,958	279,412	1,821
1860	205,038	146,610	351,648	1,846
1861	187,818	89,388	277,206	651
1862	213,912	10,186	224,098	864
1863	275,768	20,506	296,274	1,050
1864	335,369	142,457	477,826	738
1865	356,292	63,327	419,619	1,177
1866	430,778	117,878	548,656	1,742
1867	462,108	184,840	646,948	2,449
1868	506,714	300,160	806,874	2,979
1869	593,586	336,500	930,086	5,118
1870	620,000	472,403	1,092,403	5,525
1871	775,733	566,202	1,341,935	7,779
1872	941,992	530,850	1,472,842	6,427



The production of rails in the United States in 1871 was 775,733 net tons; in 1872 it was 941,992 tons. Increase, 166,259 tons, or 21½ per cent. The importation of foreign rails in 1871 was 566,202 net tons; in 1872 it was 530,850 tons. Decrease, 35,352 tons, or 6½ per cent. The net gain of the American railmaker in 1872 over his foreign rival was therefore 201,611 net tons.

Of the total production of 941,992 net tons of rails in 1872, 94,070 tons were Bessemer steel rails. In 1871 there were produced 60,042 net tons of steel and steel-headed rails. Increase, 34,028 tons, or 56⅔ per cent. Of the 530,850 net tons of rails imported in 1872, 149,786 tons were steel rails. In 1871 it is estimated that there were imported 83,887 net tons of steel rails. Increase, 65,889 tons, or 78½ per cent.

It will be seen that, while the importation of rails of all kinds was 35,352 net tons less in 1872 than in 1871, the importation of steel rails increased 65,889 tons. The reduction in the importation of all iron rails was, therefore, 101,241 tons.

The total consumption of iron and steel rails in 1871 was 1,341,935 net tons; in 1872 it was 1,472,842 tons. Increase, 130,907 tons. This increased consumption was more than equaled by the increased production of American mills, which was 166,259 tons, as above stated.

The importation in 1872 of old rails for remanufacture is carefully estimated at 170,000 gross tons. The customs regulations do not separate old rails from scrap iron; hence the necessity of estimating the quantity of each imported. The total importation of old and scrap iron in 1872 was 248,444 gross tons, valued at \$7,617,463, gold, of which Great Britain sent 108,181 tons, valued at \$3,203,746. In 1871 Great Britain sent us 139,812 tons, valued at \$3,255,849.

During the year ended December 31, 1872, the aggregate value of the imports of iron and steel, and manufactures thereof, as reported to this office by Hon. Edward Young, Chief of the Bureau of Statistics, Treasury Department, was \$60,575,514, gold, of which \$22,705,025 represents the value of new iron and steel railroad bars—\$14,498,012 of iron, and \$8,207,013 of steel.

During the year 1871, the export from the United States of

American railroad bars and rails was 306 net tons; during 1872 the export was 1,296 tons. Increase, 323 per cent. These figures of our export trade are comparatively unimportant, but they show progress in the right direction.

The following table shows the average price per ton of American iron rails from 1860 to 1873, and of British and American steel rails to 1873. The average price of gold for the same years is also given. The quotations in the column of prices of British steel rails are averaged from invoices of actual sales made by a heavy importing firm; those in the column of prices of American steel rails are averaged from invoices of actual sales and shipments made by the Pennsylvania Steel Company. The premium on gold is calculated from daily quotations in the *Banker's Magazine*.

YEARS.	Average price per ton of 2,240 lbs. of American Iron Rails.	Average Price of British Steel Rails from 1863 to 1873, in Gold. Gross Tons.	Average Price of American Steel Rails from 1867 to 1873, in Currency. Gross Tons.	Average Price of Gold from 1860 to 1873.
1860	48	.....	.....	100
1861	42 $\frac{1}{2}$	.....	.....	100
1862	41 $\frac{1}{2}$	.....	.....	113
1863	76 $\frac{1}{2}$	\$150	.....	145
1864	126	140	.....	202
1865	98 $\frac{1}{2}$	120	.....	157
1866	86 $\frac{1}{2}$	120	.....	140
1867	83 $\frac{1}{2}$	118	\$160	138
1868	78 $\frac{1}{2}$	104	158 $\frac{1}{2}$	140
1869	77 $\frac{1}{2}$	90	132 $\frac{1}{2}$	136
1870	72 $\frac{1}{2}$	87 $\frac{1}{2}$	106 $\frac{1}{2}$	115
1871	70 $\frac{1}{2}$	97 $\frac{1}{2}$	102 $\frac{1}{2}$	112
1872	85 $\frac{1}{2}$	108	112	112
1873	*80	*113 $\frac{1}{2}$	*119 $\frac{1}{2}$	*112

\* Average price for first eight months of 1873.

The first importation of steel rails was made in 1863. Steel rails were made in the United States prior to 1867, but it was not until this year that American steel rails can properly be said to have had a marketable value. Most of the rolling prior to this year was done in the way of experiment, and a very costly experiment it proved to many establishments. Very few American steel rails were made in 1867.

The steady and gratifying growth of the rail industry of this country is shown in the table of yearly production. In 1850

we manufactured 44,083 tons of 203,163 tons consumed, or 21.7 per cent. In 1860 we manufactured 205,038 tons of 351,648 tons consumed, or 58.3 per cent. In 1870 we manufactured 620,000 tons of 1,092,403 tons consumed, or 56.7 per cent. In 1872 we manufactured 941,992 tons of 1,472,842 tons consumed, or 63.9 per cent. During the whole period of twenty-four years, from 1849 to 1872, inclusive, we have manufactured more than one-half of all the rails that have been consumed in the country. During the last fifteen years, beginning with 1858, we have every year made more rails than we have imported. Our dependence upon the foreign market has decreased with the growth of the home supply. It ought to disappear altogether after this year. The capacity of the home mills, which in 1872 produced 941,992 tons, is equal to the production, when fully employed, of an increase of 20 per cent upon that product, or 1,130,390 tons in all. As the consumption of rails will not maintain the rate of increase that has existed during the past ten years, it may be safely affirmed that, if existing mills work closely up to their capacity, and if we make reasonable allowance for the enlargement of old mills, and the starting of new mills now in course of erection, the home supply of rails will be equal to any possible home demand after the first day of next January. Indeed, there exists a very strong probability that, even if there had been no financial panic in September, which impeded the progress of all railroad construction, American mills would this year have made all the rails that American railroads would have needed. As matters are, they have made more than they can take. England will send us this year about 150,000 tons, but it is exceedingly probable that there will be just this quantity of rails on hand and unsold in the country on the thirty-first day of December next, with many American mills standing idle the whole or part of the year. The American make during the year will be about 850,000 net tons, (less than last year), of which about 120,000 tons will be Bessemer rails.

In this connection it is a pertinent thought that the rails needed for the construction of our vast network of railways could not have been obtained if their manufacture in American mills had not been encouraged by the imposition of high duties on foreign rails. No

other country could have provided the rails which were made at home; nor, if it could have provided them, with our vast army of ironworkers out of employment, or engaged in less productive pursuits, would we have been able to buy them at any price. We may carry the thought farther, and assert that, without our magnificent production of rails in the last few years, we would not have needed to build the railroads we have. With our iron industry undeveloped, and thousands of ore and coal mines unopened; with a lessened demand for skilled labor, and a consequent cheapening of agricultural products; with a resulting decrease in the immigration from Europe of skilled workmen, and of other workmen in search of homes on our western prairies; with fewer towns and cities built up through the instrumentality of iron manufactures and the industries to which they give birth and encouragement, the building of railroads would not have been profitable, and European capital would have sought other fields of investment.

The situation during the past two years has been especially significant of the close and dependent relationship which exists between American railroads and American rail mills. With England's limited iron product, and our own rail mills either idle or unfinished, we could scarcely have replaced from her mills the worn-out rails upon our far-reaching and never-ending lines of railroad, and we certainly could not have procured from the same source new rails for any considerable increase in our railroad development. The London *Colliery Guardian* of March 14th, 1873, made the following admission: "If the Americans had only Great Britain to rely upon as regards their rail supplies, the construction of American railroads would probably have now to be in a great measure suspended." And for the rails that England *could* have furnished us in the absence of American competition, we would have had to pay just such a price as her ironmasters would have demanded.

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## RAILROAD PROGRESS IN THE UNITED STATES.

The railroad first undertaken in the United States for the transportation of freight and passengers was the Baltimore and Ohio, of which 23 miles were opened for use in 1830. The following table will show the number of miles constructed each year since that date. The total mileage has more than doubled since 1863.

Year.	Miles in Operation.	Annual Increase of Mileage.	Year.	Miles in Operation.	Annual Increase of Mileage.	Year.	Miles in Operation.	Annual Increase of Mileage.
1830	23		1845	4,633	256	1860	30,635	1,846
1831	95	72	1846	4,930	297	1861	31,286	651
1832	229	134	1847	5,598	668	1862	32,120	834
1833	390	151	1848	5,996	398	1863	33,170	1,050
1834	633	253	1849	7,365	1,369	1864	33,908	738
1835	1,098	465	1850	9,021	1,656	1865	35,085	1,177
1836	1,273	175	1851	10,982	1,961	1866	36,827	1,742
1837	1,497	224	1852	12,908	1,926	1867	39,276	2,449
1838	1,913	416	1853	15,360	2,452	1868	42,255	2,979
1839	2,302	389	1854	16,720	1,360	1869	47,373	5,118
1840	2,818	516	1855	18,374	1,654	1870	52,898	5,525
1841	3,535	717	1856	22,017	3,643	1871	60,677	7,779
1842	4,026	491	1857	24,503	2,486	1872	67,104	6,427
1843	4,185	159	1858	26,968	2,465			
1844	4,377	192	1859	28,789	1,821			

The following table will show the number of miles of railroad constructed in each of the United States and Territories of the United States prior to December 31, 1872.

<i>States.</i>	<i>Miles.</i>	<i>States.</i>	<i>Miles.</i>
Maine, . . . . .	871	Wyoming Territory, . . . . .	459
New Hampshire, . . . . .	810	Utah Territory, . . . . .	349
Vermont, . . . . .	710	Dakota Territory, . . . . .	234
Massachusetts, . . . . .	1,658	Colorado Territory, . . . . .	483
Rhode Island, . . . . .	136	Indian Territory, . . . . .	279
Connecticut, . . . . .	868	Virginia, . . . . .	1,537
New York, . . . . .	4,925	North Carolina, . . . . .	1,250
New Jersey, . . . . .	1,378	South Carolina, . . . . .	1,290
Pennsylvania, . . . . .	5,369	Georgia, . . . . .	2,160
Delaware, . . . . .	254	Florida, . . . . .	466
Maryland and Dist. Columbia, . . . . .	1,012	Alabama, . . . . .	1,566
West Virginia, . . . . .	561	Mississippi, . . . . .	990
Ohio, . . . . .	4,108	Louisiana, . . . . .	539
Michigan, . . . . .	2,889	Texas, . . . . .	1,078
Indiana, . . . . .	3,649	Kentucky, . . . . .	1,266
Illinois, . . . . .	6,361	Tennessee, . . . . .	1,520
Wisconsin, . . . . .	1,878	Arkansas, . . . . .	450
Minnesota, . . . . .	1,906	California, . . . . .	1,220
Iowa, . . . . .	3,643	Oregon, . . . . .	241
Kansas, . . . . .	2,341	Nevada, . . . . .	611
Nebraska, . . . . .	1,051	Washington Territory, . . . . .	65
Missouri, . . . . .	2,673		
		Total, . . . . .	67,104

The above tables are taken from Poor's Railroad Manual for 1873, the most comprehensive and reliable railroad authority in the United States. At the date of preparing this report, October 1st, we estimate the mileage of new track for the year at only 3,000 miles, a decrease since last year of more than fifty per cent. The year 1871 witnessed the culmination of railroad construction in this country. The number of miles built in that year was 7,779. The reaction commenced in 1872, when 6,427 miles were built.

Mr. W. W. Nevin, a competent authority, states the number of miles of narrow gauge (three feet) railroad which have been actually built and are now in operation in the United States to be 921½. The completion of the roads of which these 921½ miles form a part involves a total projected mileage of 3,428 miles. The same authority gives the names of other narrow gauge enterprises, which will probably within a few years add 2,000 miles of completed road to the above total.

In Mr. Poor's classification of the 67,104 miles of railroad constructed in the United States up to the first of January, 1873, 5,053 miles are located in New England, 13,499 in the Middle States, 32,303 in the Western States, 14,112 in the Southern States, and 2,137 in the Pacific States. It will be seen that about *one half* of the total mileage is in the Western States, embracing Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Kansas, Nebraska, Missouri, and Wyoming, Utah, Dakota, and Colorado Territories. It is in these States and Territories that there is to-day the greatest falling off in railroad building, and it is because of this great reaction in the West that we believe we are justified in estimating the railroad construction of 1873 at less than one half the mileage of 1872. It is there that railroad building has advanced beyond the legitimate wants of trade, and in many instances has proved to be disastrously unprofitable. It is in the West that the financial stringency of the past year has been most severely felt, making it difficult for Western railroad corporations to negotiate their bonds, either among Eastern capitalists or in Europe. In the West the farmers' movement, which is one of hostility to existing railroads, and favorable to the construction of ship canals and other competing routes to the seaboard, has obtained most

headway, making capital timid of ordinary railroad investments. Lastly, the forced suspension in September last of several large banking houses, which were largely interested in Western railroad enterprises, caused a check to the further prosecution of those enterprises from which they can not soon recover. All these causes combine to bring the railroad development of the West to a temporary stand, and it is reasonable to assume that, with the exception of a few short lines already in progress, there will be no new railroad enterprises of moment in that section prosecuted during this year or the next. But this reaction will have its compensations. It will probably lead to the strengthening of favorably located single track trunk lines in the West, by the construction of double tracks and the increase of rolling stock, and to the development of mines and manufactures along *all* existing routes. This last result will tend greatly to improve the condition of the people of the West, as well as to give freight and passenger traffic to the railroads, for it will furnish something else to sell besides raw agricultural products, which, far removed from Eastern and European consumers, can have, as compared with the products of cheese factories, woolen mills, coal and iron mines, blast furnaces and rolling mills, etc., but little marketable value. The railroads of the East have almost uniformly paid a greater percentage of profit than those of the West, because they have either passed through sections of country already blessed with a diversification of industries, or they have given substantial aid and encouragement to the promotion of adjacent mining and manufacturing enterprises. The West will now profit by this example. Instead of pushing railroads into the wilderness, where there is neither population nor trade to sustain them, the hidden resources of long settled States and Territories will be developed. It is clear that railroad building in the West has been wildly overdone, and that Western people, while looking to the railroads for cheaper freights on agricultural products, have bestowed too little attention upon the development of other sources of wealth than agriculture. It does not follow, however, that the present lull in railroad progress in the West is in any sense an evil, or that it is significant of anything else than a period of needed rest and reflection, to be followed by



a vigorous and healthy awakening. The railroad development of the West has been much too rapid, but that is no reason why it should cease altogether, or why favorably located lines should not be more profitable than ever.

As illustrative of the extent to which the business of building railroads has been carried in sections of the country which lack the population and the trade necessary to sustain them, it may be mentioned that a branch of the Chicago and Northwestern Railway was opened in September last to Lake Kampeska, in Dakota Territory, a distance of six hundred and thirty-one miles northwest from Chicago. The opening of this new route was signalized by an excursion over the road by a party of railroad officials, newspaper reporters, and others. From a report of the journey and the features of the road, which we find in a Chicago newspaper, we learn that "the new road is built upon a grant of land made by the Government to the Northwestern Company," and that it is completed according to the conditions that Congress imposed, and reaches far beyond the limits of civilization. It is not probable that trains will run for years unless a connection is made with the Northern Pacific, for there is no present use for track or cars. *There is no timber or coal to bring down, and nobody up there to carry freight to.*" The reporter adds that the train "ran mile after mile, hour after hour, without passing a house or a human being. The noise of the cars frightened immense flocks of birds from their covers, and once in a while an antelope would spring out of a tuft of grass to test his speed with the train." After more than forty hours' travel from Chicago, the train reached Lake Kampeska, the terminus, which the reporter informs us is "a beautiful sheet of water, lying like an oasis in the vast grassy desert of Dakota. A squatter had arrived before us and erected his tent—a lone habitant of a wild waste."

In the East, the great double track trunk lines have not abated their energies during the present year, for their immense traffic and great resources have given them no cause to do so. Some of these have contemplated arrangements for trebling and even quadrupling their tracks, and for extending their connections, which must necessarily, however, be modified by financial derangements



affecting the business of the whole country, and which threaten to interfere seriously with the realization of all projects demanding large expenditures of capital. It is probable, therefore, that the year 1874 will witness the construction of few new tracks upon Eastern trunk lines already having double tracks, but most new lines of short length already undertaken in the East may be expected to be prosecuted with energy to completion. The rapidity with which the lumber, petroleum, coal, iron ore, and other resources of this section are being developed renders the speedy construction of many such lines a pressing necessity. We estimate the total railroad construction of 1874 at 3,000 miles, the same mileage as the estimate for 1873.

During the years 1872 and 1873 great progress has been made in the substitution, by established lines doing a heavy business on heavy grades, of steel rails in place of the ordinary iron rails. The President of the Philadelphia and Reading Railroad Company, Franklin B. Gowen, in his annual report for 1872, says that a liberal quantity of steel rails has been laid at points where heavy grades, sharp curves, or constant switching of trains subjects the roadway to very great wear. Of the three thousand three hundred and fifty tons of solid steel rails laid on this road since 1867, less than fifteen tons have been removed from the track, and these have been taken from places where the life of iron rails had been found not to exceed four months. The increasing popularity of steel rails is further illustrated in a statement made in the report of the officers of the Baltimore and Ohio Railroad Company for 1872. They say: "It will be seen that 9,118 tons of steel rails have been used during the past year upon the main stem; 256 miles of the road are now laid with this durable and safe material. Contracts have been made for 16,000 tons, to be laid during the next year." The Chicago and Northwestern Railway Company has during the present year replaced the iron rails of its Milwaukee Division with steel rails, and it proposes to place steel rails on all its main lines. Ten thousand tons have been ordered for immediate delivery. The report of the Auditor General of Pennsylvania, for 1872, states the number of miles of railroad in the State laid with steel rails to be 1,434. The Lehigh Valley Railroad had,

on the first of January last, ninety-three miles laid with steel rails, and it is officially stated that the steel rails laid on Beaver Meadow Division in May, 1864, present a most favorable appearance. Our space will only permit these few references to the growing use and popularity of steel rails in this country.

Steel rails are also coming largely into use on Canadian railways. The main line of the Great Western Railway has been laid with 154 miles of these rails, and seventy-five additional miles will be laid this year. The first steel rails laid down three years ago on its heavy grades are still wearing satisfactorily, while the iron rails formerly used on the Copetown Incline failed before they had been twelve months on the track. The directors of the Grand Trunk Railway propose to equip their main line with steel rails throughout its entire length, and will make decided progress in carrying out this resolve during 1873 and 1874. It is expected that, by November, 1873, the line between Toronto and Montreal will be laid with steel rails to the extent of 260 miles, and by the close of 1875 it is intended that the whole road shall be of steel, a large quantity having been already laid west of Toronto and east of Montreal in addition to the central district. Canadian railway authorities agree that greater economy and greater safety are secured by the substitution of steel for iron rails—the intense cold of their winters causing the breakage of a much larger percentage of the latter than of the former. The directors of the Great Western Railway state that the cost of maintenance of way in the last half of 1872 is only £93,180 against £105,691 in the corresponding period of the previous year, although the traffic was larger and the trains more numerous. The percentage of the maintenance has fallen to 15.64 per cent. of the receipts, against 20.04 per cent. This reduction was accomplished by the use of steel instead of iron rails. It is proper to add, however, that the iron rails heretofore in use in Canada have been, in the main, inferior English rails, and below the standard of American iron rails.

The following statement from Poor's Manual shows the mileage, cost, gross earnings, etc., of 57,323 miles of the railroads of the United States in 1872, compared with similar returns of the railroads of Great Britain in 1871:

Groups for Comparison.	Rail Road Mileage.	Cost of Roads.	Cost per Mile.	Earnings.	Earnings per Mile.	Percentage of earnings to cost.	Percentage of net earnings to cost.	Earnings per head of population.
New England States,	4,574	\$230,609,794	\$50,418	\$ 48,519,835	\$10,636	21.10	6.26	\$13 53
Middle States,	11,617	922,700,774	79,427	169,205,702	14,565	18.30	6.40	15 86
Western States,	28,778	1,472,625,232	50,550	193,826,252	6,735	13.10	4.57	13 76
Southern States,	10,986	401,913,267	36,575	47,788,539	4,350	11.80	4.09	4 31
Pacific States,	1,368	131,573,990	98,300	13,900,727	10,161	10.50	6.00	17 00
United States,	57,323	3,159,423,057	55,116	473,241,055	8,256	15.00	5.20	11 76
Great Britain,	15,376	2,763,400,535	178,720	244,463,900	15,900	8.49	4 65	7 70

About 44 per cent. of the earnings of the English roads in 1871 was from passenger traffic, and 56 per cent. from freight. On the American roads in 1872 the percentage of earnings from passengers was 28, and from freight it was 72. The English roads are almost without exception double track, while a majority of the roads in the United States are single track.

The total mileage of the railroads of England, Scotland and Ireland at the close of 1872 amounted to 15,814 miles. In 1850 the mileage was 6,621 miles; in 1860, 10,433. The gross earnings of the British roads for 1872 amounted to \$250,440,000. Their length has doubled since 1853. Of the present lines, England and Wales have 11,136 miles, Scotland has 2,587, and Ireland 2,091.

An event of interest in connection with our railroad progress was consummated on the fourth of October of this year. The change of the gauge of the Grand Trunk Railway of Canada, from the English gauge of 5½ feet to the American gauge of 4 feet 8½ inches, was then completed. It is expected that by this change the Grand Trunk Railway will be enabled to interchange rolling stock with most American railroads.

The opening of the Chesapeake and Ohio Railroad, which connects the Atlantic Ocean and the Ohio River, passing through Virginia and West Virginia coal fields and iron ore deposits, is an event of the year which will greatly influence the future of the iron trade of the country.

## PRODUCTION OF STEEL IN THE UNITED STATES.

The manufacture of cast steel in the United States, which may be said to be yet in its infancy, is restricted to a very few establishments. They have had a hard struggle for existence, but the excellent reputation of American steel and the cheapness with which it can be manufactured are sure to secure for these establishments the home trade to which they are entitled if our present tariff laws be continued and importations under fraudulent undervaluations be prevented by custom-house officials. It is an industry which should be liberally encouraged, for the various manipulations to which steel is subjected give employment to large numbers of workmen, and the more steel we make at home the greater will be the inducement to make our own cutlery, saws, files, tools, etc. Our production of steel has rapidly increased within the past few years. As a consequence, our importation of the finished products of steel has not sensibly increased, while our exports of these articles have increased steadily. The following table shows the production of cast steel in the United States since 1865, as nearly as can be ascertained, in tons of 2,000 pounds :

<i>Years.</i>	<i>Tons.</i>	<i>Years.</i>	<i>Tons.</i>	<i>Years.</i>	<i>Tons.</i>
1865	15,262	1868	21,500	1871	37,000
1866	18,973	1869	23,000	1872	32,000
1867	19,000	1870	35,000	1873	28,000

The production of pneumatic or Bessemer steel in the United States since 1868 has been as follows in tons of 2,000 pounds :

<i>Years.</i>	<i>Tons.</i>	<i>Years.</i>	<i>Tons.</i>
1868	8,500	1871	45,000
1869	12,000	1872	110,500
1870	40,000	1873	*140,000

\* Estimate for the whole year.

About 85 per cent of the Bessemer steel that is now converted in American works passes into rails ; the remainder is used in various ways, no two establishments apparently pursuing the same policy in dealing with rail ends, scrap, or ingots that are not

rolled into rails. Very few rail ends are reconverted into ingots, as the process is too expensive to be profitable. Some rail ends and ingots are rolled into bars, which are used in the manufacture of agricultural implements, other machinery, tools, etc., to which this kind of steel has been found to be admirably adapted. Rail ends and scrap steel are used in the manufacture of car-wheels by the Hamilton process, and for conversion into crucible steel. Bessemer wire is an established article of American manufacture. A large manufactory of Bessemer wood screws went into operation at Cleveland in January last, which will employ 300 workmen when running to its full capacity, and will make 15,000 gross daily. There is no longer any doubt that the uses to which Bessemer steel may be applied are as various as the uses of wrought iron itself, while its great superiority over wrought iron for many purposes is equally apparent. With cheap Bessemer steel, which we are now getting, thanks to a protective tariff which has taken from England her monopoly of the supply of this product to our country, all that has ever been claimed for Bessemer's great invention would seem to be on the point of realization through the agency of American enterprise and skill.

The total quantity of pig metal converted in this country by the pneumatic process, in the year 1872, was 125,361 gross tons. During the first nine months of 1873 the total quantity converted was 127,384 tons.

The production of steel in the United States by the Siemens-Martin process aggregated only a few thousand tons in 1872. The business was confined to seven establishments. As this quality of steel can not be so cheaply produced as Bessemer steel, it is difficult to estimate the extent to which its production will be carried in future years, but we hear of one new enterprise in its manufacture having been inaugurated this year.

The rapid development of the Bessemer steel industry in the United States justifies us in presenting here the following historical facts, for most of which we are indebted to Z. S. Durfee, Esq., of New York, Secretary of the American Pneumatic Steel Association:

The first Bessemer steel rails ever rolled in this country were rolled at the North Chicago Rolling Mill, on the twenty-fourth day

of May, 1865, from hammered blooms made at the Wyandotte Rolling Mill, from ingots of steel made at the Experimental Steel Works at Wyandotte. The American Iron and Steel Association was in session at Chicago at the time, and several of its members witnessed the rolling of these rails. One of the rails was taken to the hall occupied by the Association, and exhibited, and subsequently was placed on exhibition in the lobby of the Tremont House. The Experimental Steel Works, at Wyandotte, were the first works started in this country for conducting the pneumatic, or Bessemer process. The rolls upon which the blooms were rolled at the North Chicago Rolling Mill were those which had been in use for rolling iron rails, and, though the reduction was quite too rapid for steel, the rails came out sound and well shaped. Several of these rails were laid in the track of one of the railroads running out of Chicago, and are still in use.

The first steel rails rolled in the United States upon order, in the way of regular business, were rolled by the Cambria Iron Company, at Johnstown, Pa., in August, 1867, from ingots made at the works of the Pennsylvania Steel Company, at Harrisburg, Pa., and by the Spuyten Duyvil Rolling Mill Company, at Spuyten Duyvil, N. Y., early in September of that year, from ingots made at the Bessemer Steel Works, at Troy, N. Y., then owned by Messrs. Winslow & Griswold.

Bessemer works, for the conversion of steel and the rolling of rails, are now in operation at the following places: Troy, N. Y.; Johnstown, Pa.; Harrisburg, Pa.; Bethlehem, Pa.; Newburg, Ohio; Chicago, Illinois (two separate establishments); and Joliet, Illinois. The Pennsylvania Steel Works, at Harrisburg, are building a new plant, to be completed in 1874, which will double their present capacity. The Edgar Thomson Steel Works, near Pittsburgh, Pa., are in course of erection, and it is expected will be finished in 1874.

The total annual capacity of the eight Bessemer works now in operation is about 170,000 net tons of rails; to which add Edgar Thomson, and new plant of Pennsylvania Steel Works, and the total capacity of the Bessemer Works of the United States at the close of 1874 may be placed at 222,000 net tons of rails.

## AMERICAN SHIPBUILDING.

The revival of American shipping and of American shipbuilding is one of the gratifying events of the past two years. There has been an increase in the percentage of tonnage carried in American vessels, and very great activity in all American shipyards. At Philadelphia, Chester, Wilmington, and other places on the Delaware, and at New York, at least twenty large iron steamers, besides other iron vessels, were built or building in the year which ended on the 30th of June last. They were for the Atlantic, Pacific, South American, Asiatic, and coasting trade, and in cheapness, swiftness, staunchness, and every other quality they have rivaled the best of the Clyde steamers. At various shipyards on the lakes there has been equal activity in the building of iron-bottomed steamers for the lake trade. At Pittsburgh there have been built iron vessels for the South American river trade. No iron ship is believed to have ever been built in this country of foreign iron. Iron shipbuilding in the United States may be said to have had its beginning in the year 1868, when 2,801 tons were built.

The building of wooden ships in the Maine shipyards was never so active as in 1873, and the tonnage of 1872 was almost equal to that of the year 1861, the busiest year the New England shipyards ever knew. In the Maine shipyards there were built in 1872 one hundred and seventy-three wooden vessels, the aggregate tonnage of which was 40,635,46 tons. This tonnage will be exceeded in 1873.

We subjoin the principal dimensions of the four iron steamships of the American Steamship Company, launched during 1873 from the shipyard of the Messrs. Cramp & Sons, Philadelphia :

The vessels are exactly alike in every particular. Length over all, 355 ft.; length from forward part of stem to stern-post, 343 ft.; from forward part of stem to propeller, 336 ft.; beam, extreme, 43 ft.; depth of hold from top of floors to top of spar deck, 32 ft. 6 in.; hold, molded, from spar deck stringer-plate to top of keel, 33 ft. 6 in.; depth of floor plates, 2 ft.; hold, from top of floors to top of lower deck, 16 ft. 8 in.; from top of lower deck to top of middle deck, 8 ft. 4 in.; from top of middle deck to top of spar deck, 7 ft. 6 in.; from top of keel to top of spar deck, 34 ft. 6 in. Tonnage, O. M., 3,016; capacity of coal bunkers, 720 tons. Cargo space—middle between decks, 65,101 cubic feet, at 40 cubic feet per ton, 1,627 tons; after hold, 24,107 cubic feet, 602 tons; forward, 42,082 cubic feet, 1,052 tons; upper between decks, 22,946 cubic feet, 573 tons; total, 154,236 cubic feet, 3,854 tons. Capacity for a cargo



## 46 PRODUCTION OF PIG IRON IN THE UNITED STATES.

of compressed cotton, at 30 cubic feet per bale, 5,141 bales. The draft will not exceed 20 ft. 6 in. in fresh water, with coal bunkers full, and a dead-weight cargo of 1,740 tons (2,240 lbs.) or a measurement cargo of 3,854 tons (40 cubic ft.), also a full complement of saloon and steerage passengers, officers and crew, all necessary stores and outfit on board.

Shipbuilding on the Clyde was unusually active in 1872, although the number of vessels on the stocks at the close of the year was much less than at the same time in 1871. We subjoin a record of iron vessels built on the Clyde since 1859 :

Years.	Delivered.	Measuring Tons.	On the Stocks, December 31.	Measuring Tons.
1859.....	78	35,706	52	35,950
1860.....	88	47,833	46	44,900
1861.....	88	66,801	62	41,752
1862.....	122	69,967	86	82,212
1863.....	171	123,262	147	135,804
1864.....	222	163,338	162	117,493
1865.....	229	146,692	152	129,682
1866.....	201	136,445	84	70,689
1867.....	181	97,900	113	112,361
1868.....	193	166,356	118	133,958
1869.....	204	183,210	95	123,000
1870.....	200	177,153	123	155,845
1871.....	233	211,856	193	307,909
1872.....	195	226,682	131	268,391

Statistics of iron shipbuilding in the United States are now being collected, and will be published at an early day.

## PRODUCTION OF PIG IRON IN THE UNITED STATES.

During the past summer this office has consumed much time and expended much labor in striving to accomplish two important purposes: first, the preparation of a classified list of *all* the blast furnaces in the United States, something which the iron trade has greatly needed for several years; and, second, the collection of the statistics of production of pig iron in the United States during the year 1872, and, as far as possible, in 1873. Both of these purposes have been accomplished. A complete list of blast furnaces, properly classified, is printed as a supplement to this report. It gives by States the name of each furnace, the name of the proprietor or lessee, location, post-office address, height of stack, width of bosh, date of erection, in blast in 1872 or not, and kind of fuel used.



It also embraces the names of abandoned furnaces that have been erroneously classed among those in blast, and memoranda of projected furnaces. The information contained in this list has been obtained almost entirely through direct correspondence with the owners or lessees of the furnaces.

The statistics of production are printed herewith. They show the make of 1872 in each State, the make of first six months of 1873, and the estimated make of the whole of the year 1873. They are calculated from returns made directly to this office and its agents, by the owners or lessees of all the furnaces in the country, with the exception of *twenty*, and the production of these twenty has been carefully estimated by experts familiar with their ordinary operations. Of the estimate for the last six months of 1873, it may be remarked that in the main it was made by the owner or lessee of each furnace after the commencement of the present financial crisis, and that, *in all cases*, every possible effort has been made, by correspondence and personal inquiry, to obtain accurate information concerning the extent to which the crisis has affected production. We believe that the statistics for 1872 are *absolutely correct*, and that the estimate for 1873, which is based partly upon *actual* returns for the first six months of the year, will vary but slightly from the exact figures which we hope to obtain after the close of the year.

From the tables which follow it will be seen that the production of pig iron in the United States in the year 1872 was 2,830,070 net tons, or 2,526,848 gross tons. This quantity was produced in twenty-one States. The same tables show the ascertained production during the first six months of 1873 to be 1,393,075 net tons, and the estimated production for the whole of the year 1873 to be 2,695,434 net tons, or 2,406,637 gross tons. The number of States which made pig iron this year was twenty-two—Maine having re-entered the list after a long rest. The excess of production in 1872 over the estimated production of 1873 is 134,636 net tons. If the financial crisis had not occurred, we believe that the production of 1873 would have exceeded 3,000,000 net tons. The estimated annual capacity of all the furnaces in the United States is 4,371,277 net tons.

## 48 PRODUCTION OF PIG IRON IN THE UNITED STATES.

## PRODUCTION OF PIG IRON IN 1872 AND 1873, BY STATES.

STATES.	Whole number of completed Stacks	Completed in 1872.	Completed in 1873.	Building or Projected in 1873.	Make in 1872. Tons of 2,000 lbs.	Make first six mos, 1873. Tons of 2,000 lbs.	Estimated make in 1873. Tons of 2,000 lbs.	Estimated annual capacity of completed Furnaces. Tons of 2,000 lbs.
Maine.....	1					36	1,600	2,500
Vermont.....	2				2,000	2,500	4,445	6,500
Massachusetts.....	5				17,070	10,239	19,467	24,600
Connecticut.....	10	1			22,700	11,420	21,422	27,800
New York.....	48	1	1	12	291,155	153,704	279,553	394,770
Pennsylvania.....	261	18	14	32	1,401,497	723,480	1,310,577	2,038,156
Maryland.....	22			3	63,031	29,426	57,355	86,000
Virginia.....	34	2	1	9	21,445	9,644	29,297	48,370
West Virginia.....	3	2		4	20,796	8,169	20,105	33,800
Kentucky.....	21	1		5	40,908	24,459	61,147	87,925
Tennessee.....	12		2	6	42,454	24,433	43,578	94,050
North Carolina.....	10		1	4	5,073	2,010	4,996	14,300
Georgia.....	6		2	3	2,945	2,180	6,010	15,200
Alabama.....	10		3	6	12,512	7,739	19,210	38,000
South Carolina.....	12							
Texas.....	1				619	303	303	2,600
Ohio.....	86	6	3	17	399,743	151,824	372,180	662,447
Indiana.....	8	2			39,221	21,321	34,909	69,475
Illinois.....	7		2		78,637	24,534	42,489	96,000
Missouri.....	17	1	3	9	101,158	40,878	72,873	171,160
Michigan.....	34	4	7	6	100,222	47,877	110,299	194,524
Wisconsin.....	13	1	4	1	65,036	39,263	82,582	107,400
New Jersey.....	13	2	1	4	103,858	57,655	106,037	155,700
Total.....	636	41	42	122	2,830,070	1,393,075	2,695,434	4,371,277

## CHARCOAL.

STATES.	Whole number of completed Stacks	Completed in 1872.	Completed in 1873.	Building or Projected in 1873.	Make in 1872. Tons of 2,000 lbs.	Make in first six months, 1873. Tons of 2,000 lbs.	Estimated make in 1873. Tons of 2,000 lbs.	Estimated annual capacity of completed Furnaces. Tons of 2,000 lbs.
Maine.....	1					36	1,600	2,500
Vermont.....	2				2,000	2,500	4,445	6,500
Massachusetts.....	4				12,820	6,951	13,600	16,800
Connecticut.....	10	1			22,700	11,420	21,422	27,800
New York.....	14		1		19,812	11,972	26,854	42,540
Pennsylvania.....	39		1		45,033	17,758	41,582	62,700
Ohio.....	37				95,622	25,426	89,220	135,447
Michigan.....	28	2	7	6	86,616	43,917	91,365	148,024
Wisconsin.....	10	1	3	1	27,790	19,987	41,249	52,400
Missouri.....	8		1	7	45,589	16,685	35,812	54,160
Maryland.....	14			1	29,044	13,539	26,067	40,000
Virginia.....	31	2		7	21,445	7,637	22,045	33,650
West Virginia.....	1	1		1	950	192	1,022	1,800
Kentucky.....	29	1		4	39,699	17,099	38,708	73,925
Tennessee.....	19		2	3	34,094	18,013	38,356	54,050
North Carolina.....	9		1	3	1,073	1,010	3,278	12,300
Alabama.....	10		3	6	12,512	7,739	19,210	38,000
Georgia.....	5		1	2	2,945	2,180	4,676	7,700
Texas.....	1				619	303	303	2,600
South Carolina.....	2							
Total.....	265	8	18	40	600,363	224,165	520,749	810,096

# PRODUCTION OF PIG IRON IN THE UNITED STATES. 49

## ANTHRACITE.

STATES.	Whole number of completed stacks.	Completed in 1872.	Completed in 1873.	Building or projected in 1873.	Make in 1872. Tons of 2,000 lbs.	Make in first six months, 1873. Tons of 2,000 lbs.	Estimated make in 1873. Tons of 2,000 lbs.	Estimated annual capacity of completed furnaces. Tons of 2,000 lbs.
Massachusetts.....	1	.....	.....	.....	4,250	3,288	5,867	8,000
New York.....	34	1	.....	12	271,343	141,732	252,699	352,230
New Jersey.....	13	2	1	4	103,858	57,655	106,037	155,700
Penn'vania,	Lehigh.....	47	3	6	449,663	218,459	380,084	530,000
	Schuylkill.....	40	3	3	232,225	119,628	215,725	325,200
	Upper Susquehanna.....	25	3	4	127,259	70,974	108,035	183,900
	Lower Susquehanna.....	37	1	4	159,305	89,390	159,308	276,256
Virginia.....	1	.....	.....	.....	2,007	2,007	5,474	6,720
Maryland.....	4	.....	.....	.....	21,908	9,500	16,444	25,000
Total.....	202	13	10	41	1,369,812	712,633	1,249,673	1,863,006

## BITUMINOUS COAL AND COKE.

STATES.	Whole number of completed stacks.	Built in 1872.	Built in 1873.	Building or projected in 1873.	Make in 1872. Tons of 2,000 lbs.	Make first six months, 1873. Tons of 2,000 lbs.	Estimated make in 1873. Tons of 2,000 lbs.	Estimated annual capacity of completed furnaces. Tons of 2,000 lbs.
Pennsylvania } Shenango Valley.....	314	5	2	3	160,188	79,125	158,443	315,500
Pennsylvania } Miscellaneous.....	42	3	2	4	227,823	128,146	247,400	344,600
Ohio }	Hanging Rock.....	6	1	8	23,169	12,919	27,721	36,000
	Mahoning Valley.....	28	2	1	200,785	73,861	154,007	325,500
	Miscellaneous.....	15	3	2	80,167	39,618	101,232	167,500
Indiana.....	8	2	.....	.....	39,221	21,321	34,909	69,475
Illinois.....	7	.....	.....	2	78,627	24,534	42,489	96,000
Michigan.....	4	.....	.....	.....	13,382	3,960	10,667	29,000
Missouri.....	9	1	2	2	55,569	24,183	37,061	117,000
Maryland.....	4	.....	.....	2	12,079	6,587	14,844	21,000
West Virginia.....	2	1	.....	3	19,846	7,967	19,083	32,000
Kentucky.....	1	.....	.....	1	1,209	7,360	12,444	14,000
Tennessee.....	3	.....	2	4	8,360	6,420	10,222	40,000
North Carolina.....	1	.....	.....	1	2,000	1,000	1,778	2,000
Georgia.....	1	.....	1	.....	.....	.....	1,354	7,500
Virginia.....	.....	.....	.....	1	.....	.....	.....	.....
Total.....	162	18	12	40	922,425	437,001	873,634	1,617,075

## ANTHRACITE COAL AND COKE—HALF AND HALF.

Wisconsin.....	3	.....	1	.....	37,246	19,276	41,333	55,000
Michigan.....	1	1	.....	.....	.....	.....	6,687	15,000
Total.....	4	1	1	.....	37,246	19,276	48,000	70,000

## PEAT AND CHARCOAL.

Michigan.....	1	1	.....	.....	224	.....	1,600	2,500
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## CHARCOAL AND BITUMINOUS COAL.

Virginia.....	2	.....	1	1	.....	.....	1,778	8,000
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## 50 PRODUCTION OF PIG IRON IN THE UNITED STATES.

## RECAPITULATION.

Charcoal.....	265	8	18	40	500,363	224,165	520,749	810,696
Anthracite.....	202	13	10	41	1,369,812	712,633	1,249,673	1,863,006
Bituminous coal and coke.....	162	18	12	40	922,425	437,001	873,634	1,617,075
Anthracite coal and coke.....	4	1	1	.....	37,246	19,276	48,000	70,000
Peat and charcoal.....	1	1	.....	.....	224	.....	1,600	2,500
Charcoal and bituminous coal.....	2	.....	1	1	.....	.....	1,778	8,000
Total.....	636	41	42	122	2,830,070	1,393,075	2,695,434	4,371,277

The foregoing tables are so comprehensive that extended comment is rendered unnecessary. The total number of new furnaces finished and put in blast in 1872 was forty-one; finished and put in blast in 1873, forty-two; total number of new furnaces put in blast in the last two years, eighty-three. Many of these are among the largest in the country. By the erection of these eighty-three furnaces, the furnace capacity of the country has been increased fully one-fourth. The new furnace of the Lackawanna Iron and Coal Company, at Scranton, Pa., finished in 1873, is sixty-seven feet high, and the bosh is twenty-three feet in diameter. The new furnace of the Franklin Iron Company, in Sussex County, N. J., completed in 1873, is also sixty-seven feet high, and twenty-three feet in diameter at the bosh. Of the new furnaces at Pittsburgh, four stacks, completed in 1872, deserve special mention because of their large size and great capacity. The Lucy furnace of Kloman & Carnegie Brothers is seventy-five feet high by twenty feet diameter of bosh. Its capacity is five hundred and seventy-five tons a week. The two Isabella furnaces are both seventy-five feet high, while the diameter of bosh of one is eighteen feet and of the other twenty feet. Their united capacity is nine hundred tons a week. They are owned by the Isabella Furnace Company. The Soho furnace, Moorhead, McCleane & Co., proprietors, near Pittsburgh, is sixty-five feet high by eighteen feet bosh. Its capacity is about five hundred tons a week.

Pennsylvania still maintains her position at the head of the States which make pig iron. In 1872 and again in 1873 her furnaces produced very nearly *one-half* of the total yield of the whole country. The three Western States of Michigan, Wisconsin, and Missouri, with sixty-four furnaces, have this year made *one-tenth* of the total yield.

It will be observed that there is one furnace in Texas which is making pig iron this year. It is situated near Jefferson, Marion county. A letter to this office from Mr. H. C. Hynson, of Jefferson, states that extensive and valuable iron mines exist near that place, which can be bought for five dollars an acre. Coal can be obtained at fair prices, and excellent railroad facilities exist. The Texas and Pacific Railroad will undoubtedly open up rich deposits of both iron ore and coal in Texas. Over two hundred miles of this road are now finished and in operation.

It is somewhat remarkable that there is no furnace in Delaware. Forty years ago there were many charcoal furnaces and other iron works in Sussex county, in this State, which produced iron of the best quality. There is yet an abundance of excellent ore in the county, and both anthracite and bituminous coal can easily be obtained for smelting it.

We append a table showing in tons of 2,000 pounds the production of the various kinds of pig iron in this country from 1854 to 1873, inclusive. The figures for 1872 and 1873 have already been given, and their claim to confidence has been stated. The figures for preceding years were prepared in the office of this Association, and have heretofore been published with its sanction.

Years.	Anthracite.	Charcoal.	Bituminous Coal and Coke.	Total.
1854.....	339,435	342,298	54,485	736,218
1855.....	381,866	339,922	62,390	784,178
1856.....	443,113	370,470	69,554	883,137
1857.....	390,385	330,321	77,451	798,157
1858.....	361,430	285,313	68,351	705,094
1859.....	471,745	284,041	84,841	840,627
1860.....	519,211	278,331	122,228	919,770
1861.....	409,229	195,278	127,037	731,544
1862.....	470,315	186,660	130,687	787,662
1863.....	577,638	212,005	157,961	947,604
1864.....	684,018	241,853	210,125	1,135,996
1865.....	479,558	262,342	189,682	931,582
1866.....	749,367	332,580	268,396	1,350,343
1867.....	798,638	344,341	318,647	1,461,626
1868.....	893,000	370,000	340,000	1,603,000
1869.....	971,150	392,150	533,341	1,916,641
1870.....	930,000	365,000	670,000	1,865,000
1871.....	956,608	385,000	570,000	1,912,608
1872.....	1,369,812	* 500,587	† 959,671	2,830,070
1873.....	1,349,673	‡ 524,127	§ 921,634	2,695,434

\* Includes 224 tons of peat pig iron.

† Includes 37,346 tons of mixed anthracite and coke pig iron.

‡ Includes 1,600 tons of mixed peat and charcoal pig iron, and 1,778 tons of mixed charcoal and bituminous coal pig iron.

§ Includes 48,000 tons of mixed anthracite and coke pig iron.

## PRODUCTION OF ROLLED AND FORGED IRON.

It has not been proposed to embrace in this report the statistics of the production in 1872 and 1873 of the various forms of rolled and forged iron. Facilities for the collection of these statistics in a satisfactory manner did not exist. Having, however, in this report and its supplement given to the members of the Association and the American iron trade complete and detailed information concerning the production, situation, capacity, etc., of the rail mills and blast furnaces of the country, we now propose to undertake immediately the work of preparing a complete directory of all the bar mills, forges, bloomaries, etc., and to supplement such work with accurate statistical tables showing the production in 1872 and 1873 of these establishments.

An estimate of the production in 1872 and 1873 of the merchant bar mills, plate mills, and other rolling mills, exclusive of rail mills, can be made with some approach to accuracy. Observing the classification heretofore in use in this office, we submit the following figures for 1872 and 1873, in tons of 2,000 pounds. Wm. E. S. Baker, Esq., Secretary of the Eastern Ironmasters' Association, has courteously assisted us in making this estimate.

	1872.	1873.
Merchant bar and rod.....	500,000	400,000
Sheet and plate.....	200,000	250,000
Hoop.....	30,000	30,000
Nails and spikes.....	175,000	200,000
Axles, etc.....	95,000	100,000
Total net tons.....	1,000,000	980,000
Add iron and steel rails.....	941,992	850,000
Total of rolled iron, net tons.....	1,941,992	1,830,000

The estimated production in 1871 of rolled iron other than rails was given by this office at 710,000 net tons.

The product of the forges and bloomaries of the country, strictly so-called, is estimated at 58,000 net tons in 1872, and 50,000 tons in 1873.

—The iron industry of the country has become so extensive and varied during the past few years that it is annually becoming more and more difficult to procure its statistics through private channels. The national census should be taken every five years.

## SUMMARY OF IRON AND STEEL PRODUCTION.

Below is a summary in net tons of the ascertained and estimated production of iron and steel in the United States in 1872 and 1873 :

	1872.	1873.
Iron and steel rails.....	941,992	850,000
Other rolled and hammered iron.....	1,000,000	980,000
Forges and bloomaries.....	58,000	50,000
Cast steel.....	32,000	28,000
Bessemer steel.....	110,500	140,000
Siemens-Martin steel.....	3,000	3,500
Pig iron.....	2,830,070	2,695,434

## THE IRON MANUFACTURES OF PITTSBURGH.

The rapid growth and vast proportions of the iron industry of Pittsburgh, the first of American cities in the manufacture of iron and steel, are set forth in the census of 1870, as follows—the figures embracing the suburbs of the city :

PITTSBURGH AND ALLEGHENY COUNTY.	Estab- lish- ments	Hands em- ployed	Capital.	Wages.	Materials.	Products.
			Dollars	Dollars.	Dollars.	Dollars.
Iron, blooms.....	7	714	1,125,000	430,570	2,356,190	2,923,460
forged and rolled.....	33	7,076	12,755,847	4,502,463	13,190,125	20,101,664
bolts, nuts, washers, &c	5	704	579,500	357,450	821,566	1,463,795
nails, spikes, cut, &c	10	1,132	1,668,500	577,980	2,417,054	3,229,131
pipe, wrought.....	3	177	335,000	96,000	469,800	617,000
pigs.....	4	464	1,250,000	286,000	1,494,590	2,324,000
castings (not specified)	37	1,726	2,556,000	921,465	2,316,907	3,802,911
stoves, heaters, &c...	9	321	580,000	178,108	329,362	717,670
Steel, cast.....	6	1,009	1,830,400	753,841	1,717,925	3,485,413
forged.....	1	45	200,000	60,000	120,913	200,000
springs.....	2	51	65,000	45,000	210,314	303,000
Machinery (not specified)	19	510	857,500	230,821	546,719	924,216
engines and boilers...	31	1,142	1,453,639	575,597	1,115,823	2,027,357
Total.....	167	15,071	\$25,256,386	\$9,015,295	\$27,107,288	\$42,119,617

This is a grand exhibit, but were a census of the iron industry of the city to be taken to-day it would present still more flattering results. There were four blast furnaces in 1870; now there are eleven, four of which are among the largest in the country. The consumption of pig iron in 1872 was over 400,000 gross tons, of which about 100,000 gross tons were produced by the blast furnaces of the city. The following summary, from the *Pittsburgh Commercial* of January 29, 1873, of the receipts by rail of pig iron, blooms and iron ore in the four preceding years will show the progress the city has made in that time :



RAILROADS.	1869.	1870.	1871.	1872.
	Tons.	Tons.	Tons.	Tons.
Pittsburgh, Fort Wayne & Chicago R. W...	88,510	112,400	174,490	151,500
Cleveland & Pittsburgh Railroad.....	41,750	60,810	61,600	108,190
Pennsylvania Railroad .....	58,180	68,620	58,240	86,385
West Pennsylvania Railroad .....	120	1,900	6,180	27,440
Allegheny Valley Railroad.....	7,670	8,180	14,710	19,900
Pittsburgh & Connellsville Railroad.....	1,580	4,050	11,540	21,010
Pittsburgh, Cleveland & St. Louis Railroad .....			4,160	10,090
Total tons.....	197,810	255,960	330,920	424,515

The receipts of pig iron and blooms by river during the same periods were comparatively unimportant. The receipts of iron ore alone during late years were as follows :

	1870.	1871.	1872.
Iron Mountain, tons.....not stated		36,390	67,430
Lake Superior, " .....	44,900	48,080	81,630

From June to December, 1872, there were received 20,580 tons of Lake Champlain iron ore and 4,010 tons of native ore. The ore from Lake Champlain was the first ever used in Pittsburgh.

The receipts of iron ore at Pittsburgh for the year 1873 will be very largely in excess of the receipts for 1872. In 1872 the receipts aggregated 173,650 tons. For the first seven months of 1873 the receipts amounted to 181,475 tons, being 7,825 tons more than were received during the whole of 1872. Nearly all of this ore, as in 1872, was brought from Lake Superior and other sources of supply distant from Pittsburgh, but it is probable that, hereafter, a greater percentage of native ores, obtained in Western Pennsylvania and the Virginias, will be used in the manufacture of pig iron at Pittsburgh and vicinity. In August last a local iron journal stated that a number of furnaces were already using these native ores, and others were about to do so.

It may be assumed as a fact that never before has there been so much interest manifested in the development and supply of native ores of Pennsylvania and the Virginias as at present. This is as it should be. These ores may not be the richest in the world, but they are far from being inconsiderable in quantity or insignificant in value. Every State will find its true policy to be to develop to the utmost its own mineral resources. What they lack in richness



may be more than compensated by a saving in freight and commissions.

It is a fact well established, however, that none of the native ores of Pennsylvania and neighboring States equal in value for certain purposes those of Lake Superior and Missouri; hence the manufacturers of pig iron at Pittsburgh and elsewhere are enlarging their investments in ore lands in those sections, preferring to do this rather than to pay the high prices now charged for these ores. These prices were as follows on the first of September last: Lake Superior specular, delivered at Cleveland, ten dollars a ton, one-third cash, balance in four months; Iron Mountain ore at St. Louis, ten dollars; Beaver Creek ore and Iron Ridge ore at St. Louis, eight dollars; Pilot Knob ore at St. Louis, six dollars.

### LAKE SUPERIOR IRON AND IRON ORE PRODUCTION.

We are indebted to the editor of the *Marquette Mining Journal* for the following statement in gross tons of the production of ore and pig iron in the Lake Superior district from 1856 to 1872, inclusive, together with the aggregate value. To the items in the iron ore column must be added the quantity of ore consumed in the production of the pig iron of the district, the figures in that column representing shipments.

YEAR.	Iron Ore.	Pig Iron.	Ore and Pig Iron.	Value.
1856.....	7,000	.....	7,000	\$ 28,000
1857.....	21,000	.....	21,000	60,000
1858.....	31,035	1,629	32,664	249,202
1859.....	65,679	7,258	72,937	575,529
1860.....	116,908	5,660	122,568	736,496
1861.....	45,430	7,970	53,400	419,501
1862.....	115,721	8,590	124,311	984,977
1863.....	185,257	9,813	195,089	1,416,935
1864.....	235,123	13,832	248,955	1,867,215
1865.....	196,256	12,283	208,539	1,590,430
1866.....	296,972	18,437	315,409	2 405,960
1867.....	466,076	30,911	496,987	3,475,820
1868.....	507,813	38,246	546,059	3,992,413
1869.....	633,238	39,003	672,241	4,968,435
1870.....	856,471	49,298	905,769	6,300,170
1871.....	813,379	51,225	864,604	6,115,895
1872.....	952,055	63,195	1,015,250	9,188,055
Total.....	5,545,413	357,880	5,875,722	\$44,373,833

The following table exhibits in gross tons the total product of each mine from 1856 to 1872, inclusive.

Mines.	Gross Tons.	Mines.	Gross Tons
Jackson.....	1,197,225	Republic.....	11,025
Cleveland.....	1,025,261	M. & P. Rolling Mill.....	6,772
Marquette.....	52,998	Allen.....	8,707
Lake Superior.....	1,275,919	Wilcox & Bagaley.....	4,426
New York.....	450,780	Mather.....	2,288
Lake Angeline.....	295,747	Green Bay.....	7,633
Edwards.....	121,077	Franklin.....	2,007
Iron Mountain.....	16,594	Albion.....	1,100
Barnum.....	126,977	Pittsburgh & Lake Superior	1,160
Foster.....	73,781	Michigan.....	1,227
New England.....	108,809	Quartz.....	718
Washington.....	308,919	Excelsior.....	756
Champion.....	234,867	Williams.....	447
Cascade.....	39,240	Shenango.....	197
Grand Central.....	14,755	Pendill.....	127
McComber.....	44,153	Michigamme.....	141
Parsons.....	1,896	Carr.....	18
Winthrop.....	25,027	Harlow.....	83
Saginaw.....	19,160	Shelden.....	7
Negaunee.....	11,687		
Iron Cliffs red ore.....	874	Total.....	5,508,030
S. C. Smith.....	13,445		

The excess of 37,383 tons—the difference between the footing of the yearly amounts reported and the amounts reported for each mine—is accounted for by the fact that some small mines were early abandoned, and are not now on record, while the amount of their production has been preserved.

Up to the 18th of October last, the total shipments of ore and pig iron from the Lake Superior district, for the year 1873, as compared with the same period of the year 1872, were as follows, in gross tons:

IRON ORE.			
	1873.	1872.	Increase
Marquette.....	484,517	327,985	156,532
Escanaba.....	447,567	402,727	44,840
L'Anse.....	68,031	.....	68,031
Total.....	1,000,115	730,712	269,403
PIG IRON.			
	1873.	1872.	
Marquette.....	21,793	25,259	
Escanaba.....	8,062	7,313	
Total.....	29,855	32,572	

Up to the 5th of November, the total shipments of ore and pig

iron from the district were 1,099,033 gross tons. Shipments for the season had almost closed at that date.

The Lake Superior mine now leads in the amount of ore shipments, closely followed by the Cleveland, after which the Jackson, Republic, Champion, and New York, in the order named—these companies being all that have sent away over 50,000 tons.

From Messrs. H. B. Tuttle & Co., extensive dealers in iron ore and pig iron, at Cleveland, Ohio, we learn that most of the shipments of Lake Superior ore are received at that port, and that the blast furnaces using this ore are distributed as follows: New York, 4; Pennsylvania, 53; Ohio, 48; West Virginia, 1; Indiana, 6; Illinois, 4; Wisconsin, 11; Michigan, 30; total, 157, or more than one-fourth of all the blast furnaces in the country.

The *Marquette Mining Journal* states that the producing capacity of the Lake Superior mines is this year double that of last year. We also have the authority of the same paper for the statement that the supply of first-class Lake Superior specular ore was not equal to the demand from Pittsburgh and other localities on the first of September. Ore of this class and quality contains sixty-six per cent. of pure iron. Second-class Lake Superior specular ore contains fifty to fifty-two per cent. of iron, and the hematite of the same region about forty-six per cent. These so-called inferior but really very superior ores have not been in much demand, although they can be supplied in unlimited quantities.

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## THE MINERAL RESOURCES OF THE SOUTH.

The political condition of the South since 1860 has not been favorable to the development of its mineral or other resources. The war withdrew its people from all except the most imperative productive pursuits. Since it closed, the demoralization of labor and the dissatisfaction with which the results of the struggle have been accepted by a large portion of the white population, joined to the lack of capital and the want of familiarity by Southern people

with occupations requiring mechanical skill, have militated greatly against the much needed work of recuperation and development. Passing by other industrial indications as not being within the scope of this report, it is a gratifying fact, however, that much interest has been manifested within the past year or two in the mineral wealth of the Southern States, particularly with regard to iron and coal. This interest, it is believed, is of a healthy and not merely speculative character. It has already been productive of much good, as the numerous blast furnaces and rolling mills of the South will attest. Virginia, West Virginia, Kentucky, Tennessee, North Carolina, Alabama, and Georgia, are rich in iron ore, much of it of the best quality, while all except North Carolina, which has uncounted acres of hard wood forests, possess vast deposits of bituminous coal. Labor is abundant and cheap; access to iron markets is not difficult; so that, with sufficient capital, enterprise and skill, the manufacture of pig iron and bar iron may be pursued successfully and profitably in each of the States named. Arkansas also possesses coal and iron ore, and so does Texas. The railroads that are being built through these two States will bring their wealth of iron and coal to public notice, and it is not by any means an improbable event that in less than five years they will make their own iron and send coal to their neighbors. Texas is now making pig iron from its own ore, and at Houston, one of its principal cities, are manufactured steam engines, pile drivers, and other iron machinery, and the manufacture of stoves is about being established. All of the States mentioned would greatly advance their material interests if they would cause more thorough geological surveys to be made of their mineral regions.

Kentucky should make more iron than she does. She has all the requirements necessary to produce it, including railroads and capital. Louisville should be a great iron manufacturing city. Tennessee is manifesting considerable spirit in the extension of her iron manufactures. Before the war much iron was made within her limits, and after its close she was the first of the Southern States to see the wisdom of mining ore and coal as well as growing cotton. Chattanooga, which the war rendered famous as a strategic point, is destined to become more famous as the leading iron city

of the South. A block of coal from Roane county, weighing 3,500 pounds, was sent to the Vienna Exposition, and deservedly received one of its prizes. Tennessee, however, must first have more railroads before she can profitably work many of her ore and coal mines. Alabama has an abundance of excellent coal within short distance of her navigable rivers, and with cheap water transportation to the Gulf it is certain that she will be called upon to supply a large foreign demand for this product. The West Indies and South America are natural markets for Alabama coal. This State is also rich in iron ore. Georgia has both coal and iron ore, and at Rome is centered a large iron manufacturing interest. Northwestern Georgia, Northeastern Alabama, and Southeastern Tennessee, with Chattanooga and Rome as centres, constitute a section of the South which has been bountifully endowed by nature for the manufacture of iron.

While it would be better for the South that it should smelt its own iron ore with its own coal or charcoal, it is obvious that, until her mineral wealth is better known and capital becomes more abundant within her borders, much of the iron ore to be mined by her people will be sent to other sections of the country for the supply of blast furnaces already established. The numerous railroad enterprises of the South are rapidly affording facilities for cheap transportation, thus removing a serious barrier that has heretofore existed to her mineral development. Virginia and West Virginia have gained by the extension of their railroad facilities during the present year. Pennsylvania is sure to require large quantities of their iron ore within a brief period, and in time a large trade is equally certain to be established between her manufacturers and the owners of their coal mines. North Carolina only awaits better railroad communication within her own limits than she now possesses to enable her to ship her rich iron ore to the North. In the meantime we hope she may be tempted to build more blast furnaces for the manufacture of the charcoal iron she can produce so cheaply.

Considerable quantities of Alabama and Georgia ores are shipped to the North by rail. This trade began in 1872. An effort has been made to procure full statistics of the trade, but with only

partial success. Mr. George H. Hull, of Louisville, writes us that he has sold this year about 25,000 tons of Alabama brown hematite, mined on the Selma, Rome and Dalton Railroad, and about the same number of tons of red fossiliferous, from near Birmingham, Alabama. These ores went to furnaces in Indiana and on the Ohio River. In addition to the above, Mr. Hull has sold about 3,000 tons of brown hematite, mined in Lyon county, Kentucky. The following statement of shipments by the Alabama Iron Company, whose mines are four miles south of Birmingham, Jefferson county, Alabama, is furnished us by the superintendent, Mr. W. S. McElwaine. They are included in Mr. Hull's figures :

Lafayette Iron Co.....	Brazil, Indiana.....	4,470 tons.
Western Iron Co.....	Knightsville, Indiana.....	2,616 "
Yandes, Root & Garlick.....	Brazil, Indiana.....	200 "
Roane Iron Co.....	Chattanooga, Tennessee.....	10 "
Vigo Iron Co.....	Terre Haute, Indiana.....	200 "
Bartelle & Co.....	Memphis, Tennessee.....	10 "
Vulcan Works.....	Chattanooga, Tennessee.....	10 "
Mingo Iron Works.....	Mingo Junction, Ohio.....	2,826 "
Spalding, Woodward & Co....	Steubenville, Ohio.....	380 "
Indianapolis Rolling Mill....	Harmony, Indiana.....	1,140 "
Daniel Cram.....	Pensacola, Florida.....	200 "
George H. Hull.....	Louisville, Kentucky.....	127 "
George S. Moore & Co.....	Louisville, Kentucky.....	300 "
Total tons.....	.....	12,489

The Red Mountain Iron and Coal Company, at Pratt, Jefferson county, Alabama, Mr. L. S. Goodrich, superintendent, have shipped to Mr. Hull 1,300 tons of their ore. On the 20th of September this company had contracts for 16,000 tons of ore to be sent forward. Major Thomas Peters, of Birmingham, writes us that Messrs. Boyle & Kelly had on the 20th of September 10,000 tons of ore awaiting transportation to the railroad, which was three-fourths of a mile distant. Of the ore of Northern Alabama he says that it is all red hematite or fossiliferous, and is found in a vein ten to thirty feet thick and one hundred or more miles in length. The yield of metallic iron will average forty-five to fifty per cent.

Some Tennessee ores have also been shipped North, but particulars are wanting.

## THE COAL TRADE OF THE UNITED STATES.

The iron trade of the country is so intimately blended with the coal trade that we are justified in presenting below some facts concerning coal which will be of interest to the readers of this report.

The total number of gross tons of anthracite coal shipped to market in 1872 is stated to be 19,026,125, but this does not include the consumption in the coal region, which is estimated at 3,110,000 tons, making a total of 22,136,125 tons produced in 1872—a quantity exceeding the total shipments of Cumberland coal from 1842 to 1872, inclusive, which was 21,253,688 tons. The quantity of anthracite coal sent to market in 1872 was exactly double that sent in 1863, nine years before. The shipments of Cumberland coal during the past few years have increased in a still greater ratio, having doubled since 1867. It is estimated that the production of anthracite coal in 1873 can not exceed the production of 1872 more than 2,000,000 tons, and it is the opinion of the *Pottsville Miners' Journal* and other authorities that 25,000,000 tons a year is destined to be the maximum of production for shipment outside of the counties composing the anthracite district. To produce this quantity for shipment will require a total production of at least 30,000,000 tons a year. It is alleged that there is but little new territory to develop, and that, while it is being developed so as to make possible the production annually of 8,000,000 tons more than the yield of 1872, many of the collieries in the shallow basins will gradually become exhausted. If this view of the resources of the anthracite region be correct, there will undoubtedly soon be a "coal problem" in this country as well as in Great Britain, for the use of this kind of coal is daily increasing. Happily, however, our "coal problem," when it comes, can be much more easily solved than that of Great Britain, for we have in bituminous coal a substitute for the more favored anthracite, and of this substitute our supply is practically without limit and mostly near at hand.

The shipments in 1872 of bituminous coal other than Cumberland were largely over the Pennsylvania Railroad. The total coal



tonnage of this road in 1872 was 3,669,071 tons of 2,000 pounds, of which 2,496,555 tons, or 2,229,068 gross tons, were bituminous coal, and 359,900 gross tons were coke. The remainder was anthracite. The shipments of Cumberland coal in 1872 aggregated 2,355,471 gross tons, making the total shipments of bituminous coal over eastern lines of transportation amount to 4,584,539 gross tons in 1872. The quantity of bituminous coal produced in 1872 which was not shipped over eastern lines is estimated at 15,000,000 tons. We summarize the foregoing facts and estimates as follows :

Anthracite coal sent to market in 1872, gross tons.....	19,026,125
Consumed in the coal regions in 1872, gross tons.....	3,110,000
Total anthracite produced in 1872, gross tons.....	<u>22,136,125</u>
Cumberland coal shipped in 1872, gross tons.....	2,355,471
Bituminous coal shipped over the Pennsylvania Railroad in 1872, gross tons.....	2,229,068
Bituminous coke shipped over same road in 1872, gross tons.....	359,900
Estimated bituminous production of 1872 not included in the above, gross tons.....	<u>15,000,000</u>
Total bituminous production in 1872.....	19,944,439
Total anthracite production in 1872.....	<u>22,136,125</u>
Total coal product in 1872, gross tons.....	<u><u>42,080,564</u></u>

The total number of tons of coal of all kinds produced in the census year of 1869-'70 is stated in the census report to have been 32,863,690 tons of 2,000 pounds. Reducing this product to gross tons, we have 29,342,580 tons as the product of the census year. The increase in the two and a half years ending with 1872 was therefore, according to the above estimate, 12,737,984 gross tons, or forty-three per cent.

The receipts of coal at Pittsburgh for the last three years are given by the *Commercial* of that city as follows : In 1870, 67,388,725 bushels; in 1871, 96,785,635 bushels; in 1872, 115,065,146 bushels. Of coke the receipts in the same periods were as follows : In 1870, 11,594,000 bushels; in 1871, 23,357,400 bushels; in 1872, 43,927,965 bushels. The receipts of coal alone during the last three years were by river and by rail as follows :



	Coal	Total.
1870—By river, bushels.....	44,260,000	
1870—By rail, bushels.....	23,128,725—	67,388,725
1871—By river, bushels.....	50,864,600	
1871—By rail, bushels.....	45,921,035—	96,785,635
1872—By river, bushels.....	57,708,800	
1872—By rail, bushels.....	57,356,346—	115,065,146

The following table shows the quantity of bituminous coal shipped out of the Monongahela river since 1844:

Year	Bushels.	Year.	Bushels.
1844.....	737,150	1859.....	28,286,671
1845.....	4,605,185	1860.....	37,947,732
1846.....	7,778,911	1861.....	20,865,722
1847.....	9,645,127	1862.....	18,583,956
1848.....	9,819,361	1863.....	26,444,252
1849.....	9,708,507	1864.....	35,070,917
1850.....	12,297,967	1865.....	39,522,792
1851.....	12,521,228	1866.....	42,615,300
1852.....	14,630,841	1867.....	30,072,700
1853.....	15,716,367	1868.....	45,301,000
1854.....	17,331,946	1869.....	52,512,600
1855.....	22,234,009	1870.....	57,596,400
1856.....	8,584,095	1871.....	48,621,300
1857.....	28,973,596	1872.....	54,208,800
1858.....	25,696,669		
Total.....			737,931,101

The rapid growth of the coke trade of Pittsburgh and its vicinity is a most significant illustration of our industrial development. Of this trade, what is known as Connellsville coke forms a large part and will continue to do so. It will be observed that the trade almost doubled in 1871, and again in 1872, increasing in geometrical progression.

As an indication of the growth of the coal trade of the West, it is worthy of mention that the consumption of coal in Chicago in 1872 was about 1,200,000 tons. Of this quantity about 615,000 tons arrived by the lake, of which about 450,000 tons were anthracite. The remainder was received principally from Illinois and Indiana. The whole may be classified as follows: bituminous coal, 750,000 tons; anthracite coal, 450,000 tons; total, 1,200,000.

The following analyses of several samples of anthracite coal from the three great basins in which it is found in Pennsylvania, and also of a sample of Connellsville coke, were recently made by Mr. J. Blodget Britton, an eminent metallurgical chemist of Philadelphia,

and published in *The Iron Age*, of New York. Proprietors of blast furnaces, and gentlemen connected with other branches of the iron business, will find them to be worthy of careful consideration :

AVERAGE RESULTS OF ANALYSES OF NINE FAIR  
AVERAGE SAMPLES OF GOOD ANTHRACITE  
FROM WYOMING VALLEY.

Moisture.....	1.38
Volatile combustible matter.....	3.52
Ash.....	3.24
Fixed carbon.....	91.86
	100.00

Sulphur..... .220 } Included in the above.  
Phosphorus..... .011 }

AVERAGE RESULTS OF ANALYSES OF SIX FAIR  
AVERAGE SAMPLES OF GOOD ANTHRACITE  
FROM THE SCHUTTKILL REGION.

Moisture.....	1.35
Volatile combustible matter.....	3.78
Ash.....	5.81
Fixed carbon.....	89.06
	100.00

Sulphur..... .300 } Included in the above.  
Phosphorus..... .024 }

AVERAGE RESULTS OF ANALYSES OF NINE FAIR  
AVERAGE SAMPLES OF GOOD ANTHRACITE  
FROM THE LEHIGH VALLEY.

Moisture.....	1.30
Volatile combustible matter.....	3.05
Ash.....	3.54
Fixed carbon.....	92.11
	100.00

Sulphur..... .240 } Included in the above.  
Phosphorus..... .005 }

RESULTS OF ANALYSIS OF A SAMPLE OF CON-  
NELLVILLE COKE—AN AVERAGE OF FORTY-  
NINE DIFFERENT PIECES.

Moisture.....	.490
Ash.....	11.332
Sulphur.....	.693
Phosphoric acid (phosphorus, .013).....	.029
Carbon.....	87.456
	100.000

The ash of the coke contained 47 per cent.  
of silica and 47 per cent. of alumina.

Within the last two years there has been a large increase in the development of the block coal fields of Indiana. Concerning the value of this coal, Professor E. T. Cox, State Geologist of Indiana, makes the following statement in his report for 1872: "The reputation of the block coal for smelting iron ores continues to be fully sustained by its excellent behavior in the blast furnaces that are using it." The coal is found in several of the western counties of Indiana, but thus far it has been mined principally in Clay county. A letter addressed by this office to J. J. Schrack, Esq., Secretary of the Clay County Coal Association, whose office is at Brazil, elicited the following information relative to the quality, sales, etc., of the coal produced in the district of which Brazil is the centre:

There are supplied with fuel (block coal) from this district, iron manufacturing establishments located as follows: Four blast furnaces and one muck mill in this immediate neighborhood; two blast furnaces and one nail mill at Terre Haute; one nail mill at Greencastle; two rolling mills at Indianapolis; two blast furnaces, two rolling mills and one Bessemer steel works at Chicago; one Bessemer steel works at Joliet, Illinois; one rolling mill at Decatur, Illinois, and one rolling mill in Evansville, Indiana. The following railroads get all or a portion of their supply of fuel from this district: The

St. Louis, Vandalia, Terre Haute and Indianapolis Railroad; the Jeffersonville, Madison and Indianapolis Railroad; the Indianapolis and St. Louis Railroad; the Louisville, New Albany and Chicago Railroad; the Cincinnati, Lafayette and Chicago Railroad; the Lake Shore and Michigan Southern Railroad; the Michigan Central Railroad, and the Tug Association of Chicago. Coal has also been shipped from this place to the blast furnaces of St. Louis, and in time of low water in the Ohio River to Cincinnati and Louisville. There are two veins of coal; the upper vein, averaging about three feet ten inches in thickness, and the lower one, averaging about four feet. The roof is principally sand rock, slate, and slate and sand rock mixed. Fire and potters' clay of good quality underlie the coal. The average depth to the first vein is about forty-five feet from the surface, and the second or lower vein is found about thirty feet under the first, or at an average depth of seventy-five to eighty feet. The coal is free from slate and sulphur, and can not be surpassed for furnace purposes, and is excellent for steam and domestic purposes. It burns freely and leaves a soft, fine white ash, similar to wood ash, and no clinkers. It has been decided to use it in the public schools of Chicago and Indianapolis, on account of its purity and freedom from sulphur. For domestic and steam purposes this coal is largely used in Chicago, Illinois, Indianapolis, Indiana, Kalamazoo, Michigan, and the towns and stations along the lines of most of the above named railroads. Pig iron made with this coal is particularly adapted to the manufacture of Bessemer steel. The coal field is being developed very rapidly, but we yet lack capital to erect more mills and blast furnaces, as well as other manufacturing establishments, which will insure a large and steady home consumption. A donation of fifteen acres of land has been made to the city for the purpose of a reservoir for water, which will speedily be constructed with a view of inducing manufacturers to locate their establishments here, where they will have the advantage of close proximity to the coal. The price now paid for mining is one dollar per ton. Coal is worth on the cars two dollars and fifty cents per ton, but will go up to three dollars in the winter, except to manufacturers. There are many farms here which are underlaid with coal yet untouched, awaiting the capital necessary to open their riches to the light.

From the same source we have received a complete list of the mines opened and being opened in the Brazil district, with the names of their owners and the daily capacity of the mines. Twenty-eight firms are operating thirty-six mines, the daily capacity of thirty of which is 5,350 tons. The six remaining mines had not been fully opened at the date of our informant's communication. Altogether the mines in this district alone will probably yield 1,800,000 tons of coal this year. This estimate does not include the yield of the block coal mines of Indiana outside the limits of the Brazil district, and of which no statistics are obtainable.

The Louisville, New Albany and Chicago Railroad Company propose to build branches to the coal fields in Martin, Owen and Greene counties, Ind., and the iron deposits in Martin, Monroe, Putnam and Greene counties, purchasing mineral lands and operating them on their own account. They also propose to establish

blast furnaces at New Albany and extensive coal yards at New Albany and Louisville to supply Indiana coal.

The following analyses of the coals of Indiana, by Professor Cox, include the block coal of the Brazil district :

COUNTIES.	Specific Gravity	Wt. of Cubic foot	Coke.	Volat'ile Matt'r	Ash.	Fixed Carbon	Water	Gas.
CLAY COUNTY.								
Star Mine, Planet, Furn. Block coal I	1.264	79.0	64.0	36.0	2.5	61.5	3.5	32.5
Knightsville, T. H. & I. R. R.	1.176	73.5	60.1	39.9	0.3	59.8	9.0	30.9
" " " " " "	1.167	72.9	59.0	41.0	2.0	57.0	8.0	33.0
Garlick & Collins, Brazil	1.23	76.9	60.5	39.5	3.0	57.5	8.5	31.0
North of Brazil, McClelland	1.28	79.9	56.2	43.8	1.5	54.7	5.0	38.8
Barnet's, south of Brazil	1.25	78.1	58.2	41.5	1.5	57.0	4.0	37.5
Stanton coal L, 7 feet	1.32	83.0	53.3	46.7	6.0	47.3	7.0	39.7
GREEN COUNTY.								
McClelland's coal A, 3 feet	1.19	74.3	64.5	35.5	2.0	62.5	3.5	32.0
Babbitt's coal A, 2 feet	1.24	77.3	61.4	38.6	1.5	59.9	3.0	35.6
Bledsoe's coal L	1.25	78.2	63.5	36.5	0.6	63.0	7.0	29.5
PARK COUNTY.								
Buchanan, I, 4 feet	1.23	77.0	64.5	35.5	2.0	62.5	4.5	31.0
Batty's coal K	1.23	77.0	58.5	41.5	2.5	56.0	3.0	38.5
FOUNTAIN COUNTY.								
Thomas's coal K	1.28	77.0	64.3	35.7	6.5	59.8	3.0	32.7
VERMILION COUNTY.								
Mull Bank, L	1.29	80.5	52.2	47.8	4.5	47.7	3.5	44.3

Block coal, which only a few years ago was supposed to be confined to the Shenango and Mahoning valleys, is now ascertained to exist in several States. It is an excellent fuel for iron smelting, and wherever it is found the iron business may be regarded as having received an additional impetus. Central Michigan is reported to contain this coal. It is claimed that Kentucky possesses as good block coal as can be found anywhere. Recently a vein of excellent coal of this kind was found at Pine Hill, on the Knoxville branch of the Louisville and Nashville Railroad, the discovery of which should impart a stimulus to the iron industry of that section of the State. In Jackson county, in Southwestern Illinois, is found the Big Muddy block coal, so termed, although, as Professor Macfarlane observes, "its character as block coal is not fully established." It is, however, an excellent coal for iron smelting, and large quantities of it are used for this purpose at two blast furnaces in Jackson county, and at St. Louis iron works.

## THE FARMERS AND THE RAILROADS.

Late in the past year (1872) the farmers of the West renewed with much vigor the agitation of the question of cheap transportation of agricultural products. The discussion and excitement soon became general in all the Western States, and thus far there promises to be no abatement of interest in the subject among those who are directly or remotely interested in the result of the controversy. The farmers claim that the rates of transportation heretofore charged by the railroads upon Western produce seeking Eastern or European markets have been so high that agricultural labor—the growing of wheat and corn especially—has ceased to be profitable; the railroads and the numerous middlemen who stand between the producer and the consumer receiving profits which belong of right only to the producer. As a partial remedy for this alleged injustice, they have demanded that, in default of satisfactory concessions by the railroads, the State governments shall enact such laws as will reduce the rates of transportation now charged on local freight, and that the National Government shall give encouragement to the building of a cheap freight railroad from the West to the East, and shall lend its aid to the improvement of the Mississippi river and other natural highways to the Atlantic Ocean. They also demand that the National Government shall pass a general law prescribing the maximum rates of freight on all inter-State railroads, basing such demand upon that clause of the Constitution which gives to Congress the authority to regulate commerce between the States. In preferring these demands the farmers have acted in most harmonious concert, mainly through their secret organization known as the Patrons of Husbandry, but it does not appear that the railroads have been induced by their action to materially modify their freight schedules, and the whole question, therefore, remains an open one, to be incorporated with our controversial politics and to be made the subject of State and Congressional legislation. Legislative action has already been taken by the State of Illinois, but it has not given satisfaction to the farmers within its limits, who insist

upon such supplementary legislation as will work a redress of their grievances.

Having thus fully and fairly stated the complaint of the Western farmers, and the legislative remedy they propose for one of the alleged evils from which they suffer, we will be pardoned if we restate a remedy for all their troubles which lies nearer home and is more easily secured than any legislation. This remedy is a home market for their surplus agricultural products. If the Illinois or Iowa farmer had a market near to his farm for the agricultural products he has to sell, he would be rendered independent of the Eastern or foreign market; but without such a home market, he is compelled to take for his wheat and corn whatever he can get for them at a distance, or permit them to rot in his fields. A home market would take from him all the cereals, fruits, vegetables, grasses, poultry, eggs, butter, live stock, etc., that his farm will produce; but if his dependence is upon a distant or foreign market, it will take from him little else than wheat and corn, which are among the heaviest and bulkiest crops of the farm, besides being the most exhaustive of the soil's fertility—a fertility which they never return when sold abroad.

Especially would Western farmers do well to remember that the American home market, whether located in the Mississippi Valley or in the Eastern or Southern States, has heretofore been their chief reliance for the disposal of their surplus products. The Commissioner of Agriculture estimates the wheat crop of 1873 at 260,000,000 bushels, and that, of this quantity, only 40,000,000 bushels can be spared for export. The home market for wheat is thus shown to be five and a half times as large this year as the foreign market. The *Chicago Inter-Ocean* has shown from the reports of the Treasury Department that, during the forty years from September 30, 1820, to July 1, 1860, the whole foreign demand for our flour, wheat, corn, oats, rye, barley, mess beef and pork, tallow, lard, butter, and cheese, with other produce and provisions, was exceeded in value by two of our successive *corn* crops (for the years 1869 and 1870) in the sum of \$253,420,495. In 1860 we manufactured flour to the value of \$206,000,000, and sent abroad only to the value of \$15,448,507.

The frequent fluctuations in the demand for what flour and grain we send to Europe form a strong objection to the policy of depending upon foreign markets to take our agricultural products. The foreign demand for our breadstuffs has increased in 1873, but in 1874 favorable harvests in Europe may make its people independent of our farmers. In 1864 the total export of wheat to European countries amounted to 16,826,342 bushels; but in 1865 it dropped without warning to 3,102,055 bushels, declining still further in 1866 to 1,589,321 bushels.

It may not be known to all thoughtful Western farmers how earnestly many of their own leaders have urged upon them, before the present agitation began, the same policy we have commended to their consideration. We have before us two volumes which any Western farmer would be proud to have in his library—one, the report of the Transactions of the Wisconsin State Agricultural Society for 1870, and the other the report of the Transactions of the Iowa State Agricultural Society for 1871, in both of which the value of home markets and home manufactures is most forcibly taught. At the annual exhibition by the Wisconsin State Agricultural Society, at Milwaukee, in September, 1870, Governor Austin, of Minnesota, delivered an address. Referring to the lack of prosperity among Western farmers, he said :

Another thing in the way of prosperity is the want of manufacturing establishments in our midst. There is not a threshing machine manufactured in the State of Minnesota. Probably a million of dollars a year are paid out for agricultural implements, and but a very few are manufactured in the State. The consequence is, that the country is drained of its money, which is carried off to other places, and paid for these things. Every farmer in Minnesota who buys one of Case's threshers, manufactured in Racine, or others manufactured still further east, pays eighty or ninety dollars freight on his machine, besides profits and the cost of the machine. This want of manufacturing enterprise drains the country of vast sums of money.

At the annual exhibition by the Iowa State Agricultural Society, held at Cedar Rapids, in September, 1871, E. R. Shankland, Esq., the President of the Society, delivered an address, from which the following sentences are extracted :

The sooner every city and village in our State has more manufacturing from the raw material produced in the vicinity, whether of hides, wool, flax, wood for cabinet or wagon work or agricultural implements, the better for such community and for the State at large. It is a wrong policy to pay



freight both ways on the raw material and manufactures, with the cost largely increased, and with, perhaps, half a dozen commission charges added, when so much could be saved, or, at least, our own citizens have the profit. There should be more manufactures of woolen goods, of machinery and tools and other articles of home commerce. More of our beautiful rivers and streams should be made to turn more water-wheels as they move onward to the ocean. More of our cheap coal should be used to create the motive power of steam. All the people should everywhere encourage every manufacture for which the raw material is produced in their own county. This would increase immigration, especially of the classes of operatives and mechanics, and thus increase the demand for food supplies in all our home markets.

On the 28th of September of the same year, President Magoun, of Iowa College, delivered an address before the Central Agricultural Society of Poweshiek county, in which the following views were expressed :

Introduce into any region of country a thousand mechanics and manufacturers, and you add a thousand consumers and their families, and enlarge the market and raise the prices of the farmer. There is one thing better than getting near the market, viz., having the market itself brought near you. Why should we be dependent on others for woolen and cotton goods, iron and wooden manufactures, which we can make for ourselves, and save great cost of freight? Where manufactures abound the farmer can combine his efforts for all the objects he desires; the young men can find more various and congenial occupations—for everybody has not a genius for farming—and diversified pursuits, besides spreading wealth and comfort, do something more valuable—develop and increase various intellectual powers. A railroad near a man's farm is good and necessary, as things are, but a large manufactory which he could reach with his products in his own wagon would be better. When every Iowa farmer wears the wool of his own sheep, woven in the looms of his own county, he will not have to sell his other products in distant markets, and see the profits of his labor shrink in proportion to their distance. There is no reason why we should not begin at once to furnish ourselves and the country west with fabrics of iron and wood and wool, and thus enlarge the markets of our farmers; and the day of our highest agricultural prosperity will only dawn when from the chimneys of a thousand forges and factories, driven by Iowa coal, the smoky banners of civilization shall darken the air.

Governor Carpenter, of Iowa, in his inaugural address in 1872, asked the question: "How shall the products of the soil be made to yield the largest returns by the producer?" and thus answered it:

To bring the manufactured articles required by our people, and the products of their industry, nearer together, in my judgment, is of paramount importance. That the producer would be materially benefited if the wagon, reaper, plow, and cultivator, with which he plies his industrial enterprises, and the cloth he wears, were manufactured at his market town, whither he could carry his surplus products and exchange them for these necessities, saving cost of transportation long distances both ways, is a proposition so self evident that it needs no support by argument.



## THE WEST AND IRON MANUFACTURES.

Having quoted from the published opinions of leading Western men, whose knowledge of the true interests of Western farmers can not, we presume, be questioned, it is a pleasure to be able to say that the advice of these men has already been largely followed in the Western States. Manufacturing industry is receiving encouragement heretofore denied it. A glance at the tables of iron and iron ore production accompanying this report will show how firmly the iron business has become implanted on Western soil. Michigan produces one-fourth of all the iron ore that is mined in this country. Ohio is second and Illinois third in the list of the States which make railroad bars. Indiana, Michigan, Wisconsin and Missouri are already large producers of pig iron, and formidable competitors with other States in the manufacture of the various forms of rolled iron. The great wealth of Missouri in iron ores of the richest quality is well known. The ore product of the State, in 1873, will amount to about 500,000 tons, worth at least three millions of dollars. In various branches of finished iron manufacture, and of general manufacturing industry into which iron enters largely as an element, the West has of late made astonishing advances. The annual report of the Cincinnati Board of Trade for 1872 places the total value of the manufactures of the city for that year at \$143,400,000, of which \$25,750,000 were of iron. The increase in this branch over the production of 1871 was \$3,500,000—much greater than the increase in any other branch in the same time. In 1871 Cincinnati received 59,758 tons of pig iron. In 1872 this had increased to 112,753 tons. The iron business is now the leading industry of Cleveland. Some of the largest manufactories of sewing machines and of architectural iron work are in Western cities. The manufacture of stoves is now a leading specialty in certain portions of the remote West where it was until recently wholly unknown. At Quincy, on the Mississippi river, are foundries which cast \$530,000 worth of stoves in 1872, and paid \$156,000 for labor alone. At Moline, also on the Mississippi, are some of the largest plow manufactories in the country. Plows are made here for California and Texas. At Dubuque,

another thriving young city on the Mississippi, which only a few years ago marked the northern limit of settlement on that river, are situated the Iowa Iron Works, at which were constructed this year two large iron steam yachts, forming the fifth and sixth iron steam-boats built at that city. There are extensive iron manufactures at Council Bluffs, Iowa, 500 miles west of Chicago. Milwaukee, St. Louis, Minneapolis and Chicago are manufacturing centres which make heavy machinery a specialty. At Milwaukee are located the Reliance Iron Works, covering five acres of ground, which manufacture all kinds of grist-mill and saw-mill machinery, steam engines, pile drivers, dredges, hoisting machines, steam pumps, gas and water pipes, etc. The iron manufactures of St. Louis are extensive and varied, so much so that a very strong claim has been made that this city will in the near future become the "iron centre" of the country. The near proximity of extensive iron and coal deposits, the enterprise of its business men, and its favorable location are the reasons assigned for making the claim. The city can boast the possession of nine blast furnaces. Of the \$14,000,000 worth of manufactured goods which Minneapolis, a city not twenty years old, produced in 1872, the articles having iron as a basis represented a value of \$1,482,000, composed principally of steam engines, boilers, flour-mill and saw-mill machinery, and agricultural implements. We have the authority of a leading journal in Chicago for the statement that there are to-day in that city fifteen establishments devoted to the manufacture of boilers and steam engines. They employ 885 skilled workmen at an average monthly compensation of \$57,920, or \$786 per annum per man, and consume annually 24,555 tons of iron. Their products are sent to all sections of the country, and to Cuba and Canada, and are not excelled in quality or workmanship by manufactures of a similar character in any part of the world. The Vulcan Iron Works, of Chicago, are making dredging machines for the Pennsylvania Railroad Company, to be used at Erie, and elevator machinery for the Baltimore and Ohio Railroad Company, for an elevator at Baltimore. Two rolling-mills in Chicago represent \$3,800,000 in capital, and support 7,000 persons.

All over the West all kinds of iron manufactures are springing up with marvelous rapidity, giving employment to thousands of skilled workmen, and affording farmers a home market for their products and an opportunity for their sons to engage in a variety of congenial, profitable and elevating pursuits. Shall these and other branches of manufactures be hindered in their growth and crippled in their usefulness because of free trade clamor against the policy of protection, which has built up these very industries? Shall the fires of the furnaces and rolling-mills and foundries and machine shops of the West be now put out, after they have given employment to thousands of mechanics who have paid most of their wages to neighboring farmers for the necessities of life? Rather let the farmers of the West reflect that, of the \$156,000 paid for labor by the stove manufacturers of Quincy in 1872, the larger part undoubtedly found its way into the pockets of the farmers around that city, for meat, flour, corn, vegetables, milk, fruit, etc., who were thus directly benefited by the establishment of this industry in their midst. Rather let them open wide their eyes to the fact that, wherever, as at Joliet and Milwaukee, manufactures have been established, there the farmer finds the most promising opportunities for his children and the best market for his produce, while the farm itself increases most in value.

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### THE PANIC AND THE WORKINGMEN.

The financial revulsion from which this country is now suffering has had a depressing effect upon most manufacturing enterprises. Many workmen have been compelled to submit to a reduction of wages, while many others have been temporarily thrown out of employment altogether. The iron business is more depressed than any other. In this emergency the temptation to complain of "hard times" is very great and entirely excusable, but with this temptation comes also the opportunity to contrast the condition of the average American workingman, even under present adverse circumstances, with the uniform condition of European working classes. The contrast should go far toward reconciling our countrymen to temporary privations, for it will show them how

vastly superior is the life they are permitted to lead to that of the workingmen and workingwomen of Europe. It should excite a keener appreciation of the advantages which our people possess in high wages, cheap and abundant food, low taxes, common schools, comfortable homes, and opportunities for social advancement; and it should create a corresponding distrust of those agitators who would imperil these advantages by a crusade against the enterprise and capital which have made them possible. In the days of a pinching but fleeting adversity we may profitably consider whether we have been sufficiently mindful of the sources of the prosperity we have enjoyed through many unbroken years, and which our fathers and fathers' fathers knew nothing of.

It should never be forgotten that immigrants come to this country from the manufacturing nations of Europe that they may *better their condition*. Europe has been paying better wages to her workingmen during the last two years than she has ever paid before, and yet the rewards of labor on this side of the ocean have been so superior during this period that never before in her history has there been so strong a disposition among her people to leave her shores. In 1872 there emigrated from England alone 113,763 men, women and children, nearly all of whom came to the United States. Joseph Arch, the leader of the agricultural laborers of England, has visited our country, to make arrangements for a large exodus of his class. Foreigners come to this country because poverty is practically unknown here to all who are willing to work. It is not so in Merry England, where thirty-six cents a day was all the wages Joseph Arch, with a family to support, could get for a long day's work. London is the first of English manufacturing cities, and the first in the world. During the year 1872 and the year 1873 its manufacturing establishments have been remarkably busy; as much so as those of Boston, New York, and Philadelphia; yet, of its population of 3,000,000, one out of every thirty was a declared pauper in May of this year. Here are the official figures, from the *London Times* of May 29th. They constitute the regular weekly report of the pauperism of the metropolis, made by Mr. Frederick Purdy, Chief of the Statistical Department of the Local Government Board. They tell a story which received no

comment from the *Times*, for its columns had long been familiar with just such publications as this:

## METROPOLITAN PAUPERISM.

The following is a return of the number of paupers (exclusive of lunatics in asylums, and vagrants) on the last day of the third week of May, 1873:

UNIONS.	PAUPERS.			
	Indoor.	Outdoor.		Total third week May, 1873.
		Adults & Children.	Adults.	
WEST DISTRICT.				
Kensington.....	1,040	890	547	2,477
Fulham.....	350	639	461	1,450
Paddington.....	589	1,074	631	2,294
Chelsea.....	707	535	270	1,512
St. George's.....	1,869	2,038	1,261	5,168
Westminster.....	809	393	339	1,632
Total of the West District.....	5,454	5,569	3,509	14,532
NORTH DISTRICT.				
St. Marylebone.....	2,453	1,990	937	5,380
Hampstead.....	149	100	55	304
St. Pancras.....	2,297	3,730	2,635	8,662
Islington.....	1,064	1,764	1,317	4,145
Hackney.....	817	1,830	1,436	4,083
Total of the North District.....	6,780	9,414	6,380	22,574
CENTRAL DISTRICT.				
St. Giles and St. George, Bloomsbury.....	934	420	500	1,854
Strand.....	864	299	215	1,378
Holborn.....	2,338	2,740	2,155	7,233
City of London.....	2,359	2,846	1,772	6,977
Total of the Central District.....	6,495	6,305	4,642	17,442
EAST DISTRICT.				
Shoreditch.....	1,125	1,043	913	3,081
Bethnal Green.....	1,461	702	494	2,657
Whitechapel.....	1,043	404	335	1,782
St. George-in-the-East.....	1,034	766	612	2,412
Stepney.....	830	410	179	1,419
Mile-end Old-town.....	656	531	468	1,655
Poplar.....	963	1,472	1,128	3,563
Total of the East District.....	7,112	5,328	4,129	16,569
SOUTH DISTRICT.				
St. Saviour's, Southwark.....	2,113	2,471	2,180	6,764
St. Olave's, Southwark.....	1,363	1,677	1,439	4,479
Lambeth.....	1,493	3,020	2,254	6,767
Wadsworth and Clapham.....	741	1,442	1,248	3,431
Camberwell.....	908	1,264	1,062	3,234
Greenwich.....	1,195	1,920	1,325	4,440
Woolwich.....	670	1,493	1,226	3,389
Lewisham.....	226	467	264	957
Total of the South District.....	8,709	13,754	10,998	33,461
Total of the Metropolis.....	34,550	40,370	29,658	104,578

Boston, New York, and Philadelphia present no array of pauperism at all comparable to that of the first of England's manufacturing cities.

This year there was an exposition of the industry of all nations at Vienna, the chief city and the capital of Austria. It was attended by many visitors. But some of the sights in Vienna outside the exposition were not of a nature to inspire awe or excite enthusiasm in the minds of American visitors. In Vienna many thousands of women mix mortar and carry the hod! The mortar they carry in buckets on their heads to the men who handle the brick. For this service and for carrying the hod they receive twenty-eight cents a day. At noon they swarm into the shops to purchase a piece of brown bread and fat bacon and a mug of beer, which form their dinner, and it is eaten on the curbstones. At night many of these poor women, having no homes, sleep on shavings about the buildings they are helping to rear, or in barns and sheds. Yet Vienna is a manufacturing city and one of the most beautiful cities in the world.

The American workingmen, especially those who are engaged in manufacturing industries, may well reflect that no panic, no temporary derangement of business, that has ever occurred in this country has reduced them to the condition of the English farm laborer, surrounded them with an army of paupers, or compelled them to witness homeless women carrying the hod. Such glimpses of European life as have been presented pointedly suggest that the blessings which the American workingmen have long enjoyed and which yet remain with them, despite the results of the financial panic, should be more highly prized than they have ever been; while the evil effects of the extravagance and fast living which helped to cause that panic teach them that, if they will only study more closely the arts of a wise economy, they may perpetuate these blessings for their children and their children's children. What the American workingman needs most to do to-day is to be contented with his lot and to lessen his expenses. Let him help to keep the mill and the factory running, by accepting without complaint such wages as his employer may be able to pay him. If these wages are not what they have been, he may reasonably expect that the expenses of living will in time be correspondingly reduced.

## THE GREAT WELSH STRIKE AND ITS LESSON.

During the latter part of December, 1872, and the early part of January, 1873, there occurred a general strike of the colliers of South Wales, through which about sixty thousand colliers and ironworkers were thrown out of employment, bringing them and at least two hundred and eighty thousand women and children face to face with want and starvation. The cause of the strike was a difference about wages. The coal miners, to the number of about ten thousand, demanded that their wages should be increased about ten per cent, to which demand the employers replied that, so far from acceding to the request, they would insist upon a reduction of ten per cent upon existing rates. The men struck, and the result was a general stoppage of the iron business as well as of coal mining in South Wales. A correspondent of the *London Times* gives the following history of the strike and its cost:

It appears that the strike affected nine works, owned by five different proprietors, in Monmouthshire. The number of collieries, exclusive of ironstone mines, which were included in the movement in Glamorganshire, was sixty; blast furnaces, sixty-seven; puddling and mill furnaces, seven hundred and thirty-six; and rolling mills, forty-three. In Monmouthshire there were fifty-eight collieries, sixty-two blast furnaces, seven hundred and eighty puddling and mill furnaces, and thirty-five rolling mills brought to a standstill. The number of hands employed, inclusive of men, lads, and women and girls, at the works in Glamorganshire was, in round numbers, 34,000; and in Monmouthshire the number was 31,500. The totals are one hundred and eighteen collieries, one hundred and twenty-nine blast furnaces, fifteen hundred and sixteen puddling and mill furnaces, and seventy-eight rolling mills—including bar rolls and rail mills—at which 65,500 persons found employment. Out of that number probably 5,000 men continued at work upon repairs, &c., after the twenty-eighth of December, so that it may be said, without erring greatly on one side or the other, that on that date and on the fifteenth of January, when the Dowlais colliers struck, 60,000 men, boys, and girls ceased working and took to a temporary life of idleness. The strike lasted eleven weeks at all the works except those of the Llynvi Iron Company, where it terminated on the fifteenth of February, having lasted seven weeks. If these works had remained in the same condition as the others to the end of the struggle, the loss of trade throughout the district from the twenty-eighth of December last until the end of the strike would have reached the enormous total of over £2,000,000. Deduct £50,000 as the estimated value of the coal sold and iron manufactured by the Llynvi Iron Company since the fifteenth of February, and the net loss to capital is about £1,950,000 sterling. Now let us see what the workmen have lost. The gross amount of the actual weekly payments in wages at the iron-works where the strike existed exceeded £75,000, which gives an average for every person employed of nearly twenty four shillings per week, and the figures under this head show a loss of over £800,000 sterling, after deducting the sum paid to the Llynvi



workmen during the four weeks that they have been working. Against that we have to set £40,000 distributed in the shape of strike pay by the colliers' union, and about £5,000 subscribed in various ways for the relief of sufferers; so that, after every allowance has been made, the loss which this strike has entailed upon the workmen alone amounts to no less than three-quarters of a million of pounds sterling. When we consider, moreover, that, after causing and suffering the enormous losses above shown, the workmen returned to their labor without having gained any advantage whatever, no comments are needed to show the enormity of the folly of which they were guilty.

The lesson of all strikes has often been told, but the lesson of this strike is so clear and so typical that it merits the special attention of all who would foment or encourage strikes in this country of high wages and fair play for all classes. First, it should be observed that not more than one-sixth of all the men engaged in the strike, if so many, desired that it should take place. To the extent, therefore, that the one-sixth coerced the five-sixths, the strike, in the middle of winter, was unjust and cruel and wholly indefensible. Whenever, as in this case, the few strike for higher wages and compel the many who are satisfied with their wages to strike also, the provocation must be great indeed which can justify such action. In this case the provocation was not sufficient to justify the extreme measures which were adopted. Next, it should be observed that the strike was undertaken without reasonable hope of success, and in this respect it was certainly unwise. The colliery owners and the ironmasters were masters of the situation, and could afford to stop production while the strikers could not. The right of workmen to strike for higher wages or for any other cause is not to be denied, so long as they do not seek to bind their non-participating fellows by their action, but to strike for higher wages when employers can better afford to cease production than to grant the advance asked for is foolishness. Low wages are better than none at all. Lastly, it should be noted that, even if this strike had been successful in accomplishing its object, the time lost from work by the men, and the habits of dissipation and idleness engendered or promoted, could not have been compensated by the increase in wages. We say nothing about the loss to the proprietors, and to Wales, caused by the stoppage of the works: the men themselves could not have gained anything if, at the end of a long struggle, they had conquered.



The sympathies of all right-thinking men must always be with the efforts of workmen to better their condition and that of their families, provided that these efforts are lawful and do no violence to the rights of others; but it should never be forgotten that a strike is a declaration of war, to be resorted to only in a desperate emergency, and when all other means of redress have failed. The great law of supply and demand may be better trusted to regulate equitably the wages of labor than coercive measures by workmen. If skilled labor is in demand, it will receive its reward without the intervention of strikes; if it is not in demand—if the work to be done is limited and the workmen are many, wages will necessarily be low and no strike can avail to increase them. Unskilled labor fares badly everywhere, but it seldom strikes. When it does, it generally presents stronger claims to popular sympathy than skilled labor under similar circumstances. The strike of the English agricultural laborers is one that deserves to succeed. As a rule, however, it has been demonstrated that strikes do not accomplish their object, while friendly conferences between employers and their workmen generally result in mutual satisfaction. Labor is a mailed giant, but Capital dwells in an entrenched fortress. The lesson of the Welsh strike and of most strikes is that peace is better than war.

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## THE BRITISH IRON AND STEEL INSTITUTE.

The American Institute of Mining Engineers, at its May meeting in Philadelphia, tendered an invitation to the members of the British Iron and Steel Institute—the leading iron and steel association in Great Britain—to visit the United States in 1874 and hold one of their regular meetings here. At the meeting of the British Institute at Liège, Belgium, in August last, Professor R. W. Raymond, the President of the American Institute, was present and personally renewed the invitation, which was virtually accepted by the adoption of the following preamble and resolution:

The members of the Iron and Steel Institute have received with much pleasure and satisfaction the invitation of the American Institute of Mining

Engineers to hold a meeting in the United States, and hereby desire Professor Raymond to accept the best thanks of the Institute for his invitation.

RESOLVED, That the Council of the Institute be requested to consider at an early day the feasibility of organizing a visit to America in the autumn of 1874.

The Council were to hold a meeting about the first of October, for the consideration of the above resolution. The proceedings have not yet reached us, but of the nature of the action of the Council there can be little doubt, and the honor of a visit in 1874 from the first of European iron associations may therefore be confidently relied upon. It is incumbent upon the ironmasters of the United States and especially upon this Association that such action be promptly taken, with the concurrence of the Institute of Mining Engineers, as will enable our guests to derive the utmost possible gratification from their visit, and to afford the widest opportunities for mutual comparison of views, and for mutual instruction. This country has yet much to learn from the scientific investigations of our English rivals, while they need to appreciate yet more fully than they have ever done the vast extent of our mineral resources and development and the ingenuity and skill of our ironworkers. That the members of the Iron and Steel Institute stand ready to cement and perpetuate an era of good feeling and mutual benefits between the iron trades of the two countries has been abundantly manifested by the favor with which they have received many American metallurgical inventions, but is yet more strikingly exhibited in the adoption at the meeting at Liège of the following resolution :

The members of the Iron and Steel Institute assembled at Liège, being deeply sensible of the good feeling that has at all times been shown toward the Institute by gentlemen connected with the Continental and with the American iron and steel trades, hereby resolve that the Council be requested to make the requisite arrangements for holding an international meeting of the iron and steel trades in Great Britain during the year 1875.

The foregoing reference to a probable event of great significance leads to the remark that this country does not yet possess an association corresponding to the British Iron and Steel Institute. This association, which embraces in its membership such honored names as Henry Bessemer, I. Lowthian Bell, and C. W. Siemens, holds four sessions a year, of two or three days' duration each, to

hear and discuss papers wholly relating to the scientific and economic aspects of the iron trade. No trade discussions are permitted. These meetings are regarded with the greatest interest by the members, who number several hundred of the leading ironmasters of the United Kingdom. The proceedings are published in quarterly journals of large size, and the few volumes that have been issued since the organization of the Institute constitute to-day the freshest, most pertinent, and every way the most valuable contributions to the literature of iron and steel metallurgy that are anywhere procurable. We have no such exclusive organization in this country. The American Institute of Mining Engineers is the closest approximation we have to the British Institute, but differs from it in being wider in its scope, including every subject connected with the economical production of all the useful minerals and metals. It embraces, therefore, geologists, mining engineers, and metallurgists in its membership. The American Iron and Steel Association has for its principal objects the collection of the statistics of the iron trade and the maintenance of a bureau of general intelligence and co-operation for American ironmasters. It is not a scientific organization, nor can it properly be made such.

The need of a more intimate acquaintance with the metallurgy of iron and steel will be conceded by all American ironmasters, and encouragement should be given to the establishment of an association which would give special attention to this subject, especially to new processes of manufacture, and to the most economical and productive methods of managing all kinds of iron works. The American Iron and Steel Association can not take up this work, because it does not require scientific qualifications as a condition of membership, and because its present duties absorb all the means and time at the disposal of its officers. All of the other iron associations of the country are *trade* organizations, and the discussion of scientific questions and the prices of iron would not harmonize very well at a quarterly meeting. A society of scientific gentlemen who are directly or indirectly engaged in the iron trade, to be modeled after the American Institute of Mining Engineers or the Franklin Institute, is plainly what is needed, and greatly needed.

## IRON AND THE CENTENNIAL EXHIBITION.

For more than two years the project of an International Industrial Exhibition, at Philadelphia, in 1876, in connection with the proposed Celebration of the One Hundredth Anniversary of the Declaration of American Independence, has been before the American people, and its claims to popular approval and support have been elaborately and frequently set forth. The project has received the indorsement of this Association, through the columns of its *Bulletin*, and through the same channel the advantages which would accrue to the iron interest of the country through a complete display of our iron ores and of the products of our iron manufacturing establishments have been fully stated. The value to this interest of a complete collection, accompanied by reliable analyses, of all the iron ores of the country is incalculable, and it is earnestly to be hoped that the iron manufacturers and the owners of iron ore deposits will co-operate in the work of securing such collection and analyses. The editor of the New York *Iron Age* has tersely presented in the following sentences the reasons why there should be a full display of our iron ores at the proposed Exhibition :

"It has been urged as a reason for making a creditable display of our iron ores at the Exhibition, that we should take advantage of the opportunity to show the representatives of other nations the extent, variety and value of our iron resources. A still better reason is found in the fact that we ourselves want to know what our resources are. In a country of such vast extent, and so sparsely populated in proportion to territory, as compared with other and older countries, no comprehensive or accurate geological survey has been possible. New discoveries of great interest and importance are made almost daily, and it is impossible for the best informed person to gain more than a general and very imperfect idea of what ores are or may be mined in sections of the country with which he is not personally familiar. It is literally true that we do not know what our own resources are, and it is especially desirable that we should know."

A letter has been addressed by Hon. Daniel J. Morrell, Chairman of the Executive Committee of the Centennial Commission, to the President of this Association, in which the collection of iron ores for the Exhibition is referred to the Association. This trust has been accepted by the Executive Committee of the Association, and we feel authorized to say that no unnecessary delay will be permitted to interfere with its proper and satisfactory discharge.

## PERSONAL AND HISTORICAL MENTION.

Among the deaths of the past two years which have invaded the ranks of the iron trade of this country, and its friends, may be mentioned that of Hon. Horace Greeley, in the latter part of 1872—a distinguished and life-long advocate of the doctrine of protection to American industry. Also the death in May, 1872, of Joseph H. Scranton, Esq., President of the Lackawanna Iron and Coal Company, located at Scranton, Pa. Also the death of Col. James M. Cooper, of Pittsburgh, in October, 1872, a gentleman who had been long and prominently identified with the practical manufacture of iron and steel in that city, and with the defense of the same policy which Mr. Greeley labored so hard to establish. Also the death in August, 1873, at Johnstown, Pa., of George Fritz, an engineer and iron metallurgist of rare attainments and wide reputation, and at the time of his death and for many previous years in charge of the mechanical department of the Cambria Iron Works. Charles S. Wood, Esq., the President of the Cambria Iron Company, died suddenly in Philadelphia on the 27th day of May, 1873. Mr. Wood, Mr. Scranton, and Mr. Cooper were at the time of their death Vice Presidents of this Association, and members of its Executive Committee.

During the year 1873 occurred the Exposition of the industry of all nations at Vienna, at which, it is much to be regretted, the United States did not bear so honorable a part as its enterprise and skill in scientific and mechanical pursuits entitled it. This was wholly the fault of Congress, which delayed too long to make suitable provision for the transportation, classification and display of articles for exhibition by American inventors, manufacturers, and others. On the 8th day of January last this Association appealed to American ironmasters to make as creditable a display of their products at Vienna as was then possible. To show how meagre was the display of American products at the Exposition, it may be stated that, at its close, there were distributed over four hundred diplomas of honor,—the only prize which conferred a really valuable distinction, of which only eight were awarded to this country. Of these, four were awarded to the

group of education, and four to individuals. The list is as follows : Education—Smithsonian Institution, National Bureau of Education, State of Massachusetts, City of Boston ; Individuals—Samuel S. White, of Philadelphia, for dental instruments and artificial teeth ; Walter A. Wood, Hoosac Falls, New York, mowing and reaping machines ; William Sellers & Co., Philadelphia, puddling furnace and tools, and George H. Corliss, New York, for perfection of steam-engines. Among the minor prizes distributed to American exhibitors, we notice many for improvements and excellence in machinery. American iron ores, iron products and coal were not wholly unrepresented, or overlooked in the distribution of prizes.

During the third session of Congress, commencing December 2, 1872, and ending March 4, 1873, there was no tariff legislation affecting the iron and steel industries of the country.

Of the iron and steel enterprises undertaken or completed during the year 1873, the following are worthy of mention : In January the Bessemer department of the Joliet Iron and Steel Works, at Joliet, Illinois, was successfully started, and in October that of the Bethlehem Iron Works, at Bethlehem, Pa., made its first blow and first rail with gratifying results. Early in 1873 ground was broken for the erection of the Edgar Thomson Steel Works, near Pittsburgh, for the manufacture of Bessemer steel and rails, work upon which has been rapidly pushed during the year. The Pennsylvania Steel Company have commenced the extension of their works at Baldwin Station, near Harrisburg, Pa., which will double their present capacity when completed. The fine rolling-mill at Evansville, Indiana, for the manufacture of iron rails, was completed in June last and started under most favorable auspices.

An event of much significance to the iron trade of the United States was the establishment in 1873 of the line of large iron steamers owned by the American Steamship Company. These steamers are four in number ; they were built at Philadelphia by Cramp & Sons, wholly with American capital, and are to ply regularly between Philadelphia and Liverpool. They constitute the only line of transatlantic steamers owned wholly in this country. Its estab-

lishment proves that the revival of American commerce has commenced under circumstances which show that American maritime enterprise and mechanical skill are equal to any emergency without the aid of subsidies and drawbacks. Philadelphia may well be proud of this magnificent line.

During the past year friendly correspondence has taken place between this Association and other associations and individuals representing like and allied industries. The virtual if not formal federation of home industries, for mutual help and protection, and the harmonizing of interests, is necessary to the general prosperity, and this Association is prepared to give its encouragement and assistance to the accomplishment of closer industrial unity. It has conceived and presented a plan for a substantial union of all the iron and steel associations of the country, which has met with favorable consideration. It has heretofore co-operated harmoniously with the textile, coal, copper, and other large producing interests, and it has manifested antagonism to none. This policy it will aim hereafter to pursue without variation or exception.

The Silk Association of America, now scarcely one year old, is one which we take special pride in mentioning as among the associations with which we have friendly relations, because it was only through the application by Congress to the silk industry of the country of the policy of protection for which this Association has always contended that it was possible for the industry to become established on a firm foundation. It is now in a flourishing condition. There are one hundred and forty-seven firms and corporations engaged in the manufacture of silk in the United States, representing a capital of \$15,316,414. In 1872 the value of the total product of these establishments was \$25,073,201, and the amount of wages paid was \$4,878,054 to 11,713 operatives, most of whom were women and girls. In addition to the one hundred and forty-seven firms above mentioned, there are in the United States fifty-three other firms which use a limited amount of silk in connection with other material, making two hundred firms in all, arranged in five divisions: Maryland has 2, Pennsylvania 26, New England 37, New Jersey 35, and New York 100.

On Thursday, September 18th, the great financial panic of 1873,



the effects of which are still apparent in every branch of productive business, commenced in Philadelphia by the suspension of a banking firm which had acted as the fiscal agent of the Northern Pacific Railroad Company. This company, having secured a large grant of public land, had undertaken to construct a railroad 2,000 miles long from Lake Superior to Puget Sound. On the 18th of September, five hundred miles of this road had been constructed, eighty miles more were expected to be finished by the 1st of January, 1874, and a further addition of two hundred miles in the year 1874 was regarded as probable. One effect of the business failure alluded to was the stoppage of work on the road in question; but while the work has been arrested, and the credit of the company has been impaired by that failure, it should not be inferred that the road will not be built. It may not be greatly needed to-day, but it will become a necessity before many years. Its route is marked out by nature for a great commercial highway, and such it is destined to become.

—In closing this report, we take pleasure in adding the expression of our indebtedness to George W. Cope, Esq., our only assistant, for intelligent and valuable services rendered in the work of this office during the past nine months.

Respectfully submitted.

JAMES M. SWANK,

*Secretary.*

To

SAMUEL J. REEVES, Esq.,

*President of the American Iron and Steel Association.*



## APPENDIX.

PRICES IN PHILADELPHIA OF No. 1 ANTHRACITE  
FOUNDRY PIG IRON, FOR THIRTY YEARS,  
FROM 1842 TO 1873.

TONS OF 2,240 LBS.

Compiled by WM. G. NEILSON for the American Iron and Steel Association.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average.*	Year.
1842.....					27	27	26 $\frac{1}{2}$	24 $\frac{1}{2}$	25 $\frac{1}{2}$	25	25	25	.....	1842
1844.....	24	24	24	24	24	24	26 $\frac{1}{2}$	26 $\frac{1}{2}$	27 $\frac{1}{2}$	28	27 $\frac{1}{2}$	26 $\frac{3}{4}$	.....	1844
1845.....	26 $\frac{3}{4}$	26 $\frac{3}{4}$	27 $\frac{3}{4}$	33 $\frac{1}{2}$	34 $\frac{1}{2}$	33	31	28	27 $\frac{1}{2}$	26 $\frac{3}{4}$	28 $\frac{1}{2}$	28	29 $\frac{1}{2}$	1845
1846.....	28	28	28 $\frac{1}{2}$	28	28 $\frac{1}{2}$	28	29	29	27 $\frac{1}{2}$	27	28 $\frac{1}{2}$	28 $\frac{1}{2}$	27 $\frac{1}{2}$	1846
1847.....	28 $\frac{1}{2}$	28 $\frac{1}{2}$	28 $\frac{1}{2}$	29	29	28 $\frac{1}{2}$	28	28 $\frac{1}{2}$	30 $\frac{1}{2}$	33 $\frac{1}{2}$	35 $\frac{1}{2}$	33 $\frac{1}{2}$	30 $\frac{1}{2}$	1847
1848.....	31	28 $\frac{1}{2}$	27 $\frac{1}{2}$	26 $\frac{3}{4}$	26 $\frac{1}{2}$	26 $\frac{1}{2}$	25 $\frac{1}{2}$	25 $\frac{1}{2}$	25 $\frac{1}{2}$	25	25	24 $\frac{3}{4}$	26 $\frac{1}{2}$	1848
1849.....	25	24 $\frac{3}{4}$	24 $\frac{3}{4}$	34	23 $\frac{1}{2}$	23	23 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	20	21	22 $\frac{1}{2}$	1849
1850.....	21	21	30 $\frac{3}{4}$	30 $\frac{3}{4}$	20 $\frac{1}{2}$	20 $\frac{1}{2}$	20	20 $\frac{1}{2}$	21	21	21	21 $\frac{3}{4}$	21	1850
1851.....	21 $\frac{1}{2}$	22	22	22	21	21 $\frac{1}{2}$	21	21	21	21	21	21	21 $\frac{1}{2}$	1851
1852.....	21 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{3}{4}$	20 $\frac{3}{4}$	20 $\frac{1}{2}$	20 $\frac{1}{2}$	21 $\frac{1}{2}$	23 $\frac{1}{2}$	26 $\frac{1}{2}$	27 $\frac{3}{4}$	28 $\frac{1}{2}$	22 $\frac{1}{2}$	21 $\frac{1}{2}$	1852
1853.....	32 $\frac{3}{4}$	36 $\frac{3}{4}$	35 $\frac{3}{4}$	35 $\frac{3}{4}$	35 $\frac{3}{4}$	36	36	36	36 $\frac{1}{2}$	37 $\frac{1}{2}$	37 $\frac{1}{2}$	36 $\frac{1}{2}$	36 $\frac{1}{2}$	1853
1854.....	37	36 $\frac{1}{2}$	37	38	38	38	38	38	37 $\frac{3}{4}$	36 $\frac{1}{2}$	35 $\frac{1}{2}$	32 $\frac{1}{2}$	36 $\frac{1}{2}$	1854
1855.....	31 $\frac{1}{2}$	29 $\frac{1}{2}$	27 $\frac{1}{2}$	26 $\frac{3}{4}$	26 $\frac{1}{2}$	26 $\frac{1}{2}$	26 $\frac{1}{2}$	26 $\frac{1}{2}$	28	28	28 $\frac{1}{2}$	27 $\frac{3}{4}$	27 $\frac{3}{4}$	1855
1856.....	27 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$	28	28	27 $\frac{1}{2}$	27	27	27	26 $\frac{3}{4}$	26	26	27 $\frac{1}{2}$	1856
1857.....	26 $\frac{1}{2}$	26 $\frac{1}{2}$	26 $\frac{3}{4}$	27 $\frac{3}{4}$	27 $\frac{3}{4}$	27 $\frac{3}{4}$	27 $\frac{3}{4}$	26 $\frac{3}{4}$	26 $\frac{3}{4}$	25 $\frac{3}{4}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	26 $\frac{1}{2}$	1857
1858.....	23 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	22 $\frac{1}{2}$	1858
1859.....	22 $\frac{1}{2}$	23 $\frac{1}{2}$	24 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23	23	22 $\frac{1}{2}$	22 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	23 $\frac{1}{2}$	1859
1860.....	23	23	23 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	22 $\frac{1}{2}$	1860
1861.....	22 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	20 $\frac{1}{2}$	19 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$	19 $\frac{1}{2}$	20 $\frac{1}{2}$	1861
1862.....	20	20 $\frac{1}{2}$	20 $\frac{1}{2}$	21 $\frac{1}{2}$	21 $\frac{1}{2}$	22 $\frac{1}{2}$	24	24	24	25 $\frac{1}{2}$	30 $\frac{1}{2}$	31 $\frac{1}{2}$	23 $\frac{1}{2}$	1862
1863.....	32	33 $\frac{1}{2}$	35 $\frac{1}{2}$	36	34 $\frac{1}{2}$	33 $\frac{1}{2}$	32 $\frac{1}{2}$	31 $\frac{1}{2}$	33	35 $\frac{1}{2}$	41 $\frac{1}{2}$	43 $\frac{1}{2}$	35 $\frac{1}{2}$	1863
1864.....	43 $\frac{1}{2}$	48 $\frac{1}{2}$	50 $\frac{1}{2}$	54 $\frac{1}{2}$	57 $\frac{1}{2}$	57 $\frac{1}{2}$	69 $\frac{1}{2}$	73 $\frac{1}{2}$	72 $\frac{1}{2}$	63 $\frac{1}{2}$	61 $\frac{1}{2}$	59 $\frac{1}{2}$	59 $\frac{1}{2}$	1864
1865.....	58 $\frac{1}{2}$	53 $\frac{1}{2}$	50 $\frac{1}{2}$	45 $\frac{1}{2}$	39 $\frac{1}{2}$	35	35 $\frac{1}{2}$	40 $\frac{1}{2}$	44 $\frac{1}{2}$	49 $\frac{1}{2}$	51	50 $\frac{1}{2}$	46 $\frac{1}{2}$	1865
1866.....	50 $\frac{1}{2}$	49	46 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	43 $\frac{1}{2}$	46 $\frac{1}{2}$	47 $\frac{1}{2}$	45 $\frac{1}{2}$	48 $\frac{1}{2}$	49 $\frac{1}{2}$	49 $\frac{1}{2}$	46 $\frac{1}{2}$	1866
1867.....	48 $\frac{1}{2}$	46 $\frac{1}{2}$	44 $\frac{1}{2}$	41	42 $\frac{1}{2}$	43 $\frac{1}{2}$	43 $\frac{1}{2}$	44	41 $\frac{1}{2}$	44 $\frac{1}{2}$	43 $\frac{1}{2}$	42 $\frac{1}{2}$	44 $\frac{1}{2}$	1867
1868.....	38 $\frac{1}{2}$	36 $\frac{1}{2}$	37 $\frac{1}{2}$	38 $\frac{1}{2}$	37	37	38	39 $\frac{1}{2}$	40 $\frac{1}{2}$	41 $\frac{1}{2}$	42 $\frac{1}{2}$	43 $\frac{1}{2}$	39 $\frac{1}{2}$	1868
1869.....	43	40 $\frac{1}{2}$	41 $\frac{1}{2}$	40	39 $\frac{1}{2}$	40 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	40 $\frac{1}{2}$	39 $\frac{1}{2}$	39 $\frac{1}{2}$	40 $\frac{1}{2}$	40 $\frac{1}{2}$	1869
1870.....	36 $\frac{1}{2}$	31 $\frac{1}{2}$	34 $\frac{1}{2}$	33 $\frac{1}{2}$	33 $\frac{1}{2}$	32 $\frac{1}{2}$	32 $\frac{1}{2}$	33 $\frac{1}{2}$	33 $\frac{1}{2}$	32 $\frac{1}{2}$	31 $\frac{1}{2}$	31 $\frac{1}{2}$	33 $\frac{1}{2}$	1870
1871.....	30 $\frac{1}{2}$	30 $\frac{1}{2}$	34 $\frac{1}{2}$	35 $\frac{1}{2}$	35 $\frac{1}{2}$	35	35 $\frac{1}{2}$	36	36 $\frac{1}{2}$	36 $\frac{1}{2}$	37 $\frac{1}{2}$	37 $\frac{1}{2}$	35 $\frac{1}{2}$	1871
1872.....	37	40 $\frac{1}{2}$	47	49 $\frac{1}{2}$	49 $\frac{1}{2}$	53 $\frac{1}{2}$	51 $\frac{1}{2}$	52 $\frac{1}{2}$	53 $\frac{1}{2}$	53 $\frac{1}{2}$	51 $\frac{1}{2}$	47 $\frac{1}{2}$	48 $\frac{1}{2}$	1872
1873.....	45 $\frac{1}{2}$	48	48 $\frac{1}{2}$	47 $\frac{1}{2}$	46	45	43 $\frac{1}{2}$	43 $\frac{1}{2}$	42 $\frac{1}{2}$	38	.....	.....	44 $\frac{1}{2}$	1873

\* Average for year to nearest eighth.

† Uncertain.

‡ Lowest average for month, \$18 $\frac{3}{4}$ —October, 1861.§ Lowest average for year, \$20 $\frac{1}{2}$ —1861.|| Highest average for month, 73 $\frac{1}{2}$ —August, 1864.¶ Highest average for year, 59 $\frac{1}{2}$ —1864.

From 1842 to July, 1866, averaged monthly from weekly quotations in Philadelphia and New York prices current. From July, 1866, to 1873, averaged from weekly quotations in Bulletin of the American Iron and Steel Association.

# PRICES OF AMERICAN IRON RAILROAD BARS IN PHILADELPHIA FOR TWENTY-SIX YEARS, FROM 1847 TO 1873.

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AVERAGED MONTHLY FROM WEEKLY QUOTATIONS.  
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—  
TONS OF 2,240 LBS.  
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Compiled by Wm. G. NEILSON for the American Iron and Steel Association.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average.	Average price of Gold.
1847...	71 $\frac{3}{4}$	70 $\frac{3}{4}$	70	70	70	70	69 $\frac{1}{2}$	69 $\frac{1}{2}$	67 $\frac{1}{2}$	67	67 $\frac{1}{2}$	67 $\frac{1}{2}$	.....	100
1848...	63	63	63	63	63	63	63	61 $\frac{3}{4}$	61 $\frac{3}{4}$	61	61	61	62 $\frac{1}{2}$	100
1849...	61	57 $\frac{1}{2}$	53 $\frac{3}{4}$	53 $\frac{3}{4}$	54 $\frac{1}{4}$	53 $\frac{1}{2}$	53 $\frac{1}{2}$	53 $\frac{1}{2}$	52	51 $\frac{1}{2}$	51 $\frac{1}{2}$	51 $\frac{1}{2}$	53 $\frac{1}{2}$	100
1850...	47	47 $\frac{1}{2}$	48	49	49	50	46	46 $\frac{3}{4}$	47 $\frac{1}{2}$	48	48	48	47 $\frac{1}{2}$	100
1851...	43	44 $\frac{1}{2}$	47 $\frac{1}{2}$	45	45	48	46	45 $\frac{1}{2}$	45	45	46	46 $\frac{1}{2}$	45 $\frac{1}{2}$	100
1852...	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	47 $\frac{1}{2}$	46 $\frac{1}{2}$	51	61	48 $\frac{1}{2}$	100
1853...	74 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	77 $\frac{1}{2}$	100
1854...	81	81	81	81	81	81	81	81	81	81	81	81	81	100
1855...	70	65	62 $\frac{1}{2}$	60	58 $\frac{1}{2}$	59 $\frac{1}{2}$	59 $\frac{1}{2}$	59 $\frac{1}{2}$	64 $\frac{1}{2}$	65	65	63	62 $\frac{1}{2}$	100
1856...	62 $\frac{1}{2}$	62 $\frac{1}{2}$	63 $\frac{1}{2}$	65	65	65	65	65	65	65	65	64	64 $\frac{1}{2}$	100
1857...	65 $\frac{1}{2}$	65 $\frac{1}{2}$	64 $\frac{1}{2}$	65 $\frac{1}{2}$	67	67	67	67	67	67	58 $\frac{1}{2}$	50	64 $\frac{1}{2}$	100
1858...	50	50	50	50	50	50	50	50	50	50	50	50	50	100
1859...	49 $\frac{3}{4}$	49 $\frac{3}{4}$	49 $\frac{3}{4}$	50 $\frac{1}{4}$	50 $\frac{1}{4}$	50 $\frac{1}{4}$	49 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	49 $\frac{3}{4}$	100
1860...	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	48 $\frac{3}{4}$	46	47	47 $\frac{1}{2}$	47 $\frac{1}{2}$	46 $\frac{1}{2}$	48	100
1861...	44	44	44	44	44	44	44	43 $\frac{3}{4}$	43	41 $\frac{3}{4}$	38 $\frac{1}{2}$	36 $\frac{1}{2}$	42 $\frac{3}{4}$	100
1862...	136 $\frac{1}{2}$	136 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	41 $\frac{1}{2}$	43	43 $\frac{3}{4}$	46	46	41 $\frac{1}{2}$	113
1863...	72 $\frac{1}{2}$	69 $\frac{1}{2}$	72 $\frac{1}{2}$	73 $\frac{1}{2}$	73 $\frac{1}{2}$	78 $\frac{1}{2}$	81 $\frac{1}{2}$	78 $\frac{1}{2}$	72 $\frac{1}{2}$	79 $\frac{1}{2}$	87 $\frac{1}{2}$	87 $\frac{1}{2}$	76 $\frac{1}{2}$	145
1864...	94	101 $\frac{1}{2}$	105	111	120	127 $\frac{1}{2}$	141 $\frac{1}{2}$	152 $\frac{1}{2}$	155 $\frac{1}{2}$	140	133 $\frac{1}{2}$	132	126	202
1865...	125 $\frac{1}{2}$	121 $\frac{1}{2}$	116 $\frac{1}{2}$	108 $\frac{1}{2}$	90 $\frac{1}{2}$	84 $\frac{1}{2}$	82 $\frac{1}{2}$	86 $\frac{1}{2}$	90	92 $\frac{1}{2}$	95	91	98 $\frac{1}{2}$	157
1866...	90	90	87 $\frac{3}{4}$	84 $\frac{1}{2}$	84	85 $\frac{3}{4}$	86 $\frac{3}{4}$	87	87 $\frac{1}{2}$	87 $\frac{3}{4}$	85	85	86 $\frac{1}{2}$	140
1867...	85	85	84 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	82 $\frac{1}{2}$	83 $\frac{1}{2}$	138
1868...	81 $\frac{1}{2}$	79	79	79	79	79	79	79	79	78 $\frac{1}{2}$	76	78 $\frac{1}{2}$	78 $\frac{1}{2}$	140
1869...	76 $\frac{1}{2}$	76	76	76	76	76	76	80	78 $\frac{1}{2}$	78 $\frac{1}{2}$	78 $\frac{1}{2}$	78 $\frac{1}{2}$	77 $\frac{1}{2}$	136
1870...	74	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	70 $\frac{1}{2}$	70	72 $\frac{1}{2}$	115
1871...	68 $\frac{1}{2}$	69	69	69 $\frac{1}{2}$	71	71	71	71	71	71	71	71	70 $\frac{1}{2}$	112
1872...	71 $\frac{1}{2}$	75 $\frac{1}{2}$	81 $\frac{1}{2}$	83 $\frac{1}{2}$	90 $\frac{1}{2}$	90	89	87 $\frac{1}{2}$	88 $\frac{1}{2}$	88 $\frac{1}{2}$	88 $\frac{1}{2}$	85 $\frac{1}{2}$	85 $\frac{1}{2}$	112
1873...	83 $\frac{1}{2}$	83	83	82	80	78	76	75	75	70	.....	.....	78 $\frac{1}{2}$	112

From 1847 to 1866 from Philadelphia Prices Current, except for years 1850 and 1851, for which estimates were furnished by Mr. S. J. REEVES. From 1866 to 1873 from Bulletin of the American Iron and Steel Association, averaged from weekly quotations.

☞ Prices averaged for years to nearest eighth.

\* For latter part of 1857 prices were probably only nominal. † Uncertain.

‡ Lowest months, \$36 $\frac{1}{2}$  = { November and December, 1861. | Lowest year, \$41 $\frac{1}{2}$  — 1862.  
January and February, 1862. ¶ Highest year, \$126 — 1864.

§ Highest month, \$153 $\frac{1}{4}$  — September, 1864.

☞ The annual premium on gold is calculated from daily quotations of gold sales in the Banker's Magazine.

# PRICES OF ANTHRACITE COAL FOR FORTY-SEVEN YEARS, FROM 1826 TO 1873.

*Prices of Schuylkill White Ash Lump Coal by the Cargo at Philadelphia. Averaged monthly from mean of weekly quotations in Prices Current, Philadelphia. Tons of 2,240 lbs.*

Prepared for the American Iron and Steel Association by WM. G. NEILSON and ISRAEL W. MORRIS.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year.
1826...				7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.50	7.80	
1827...	7.00	7.00	7.00	7.00									
1828...										7.50	7.50	*7.25	
1829...													
1830...	*7.25	*7.25	*6.00	*5.75	5.75	5.75	5.75	5.75	5.75	5.75			
1831...			6.00	5.50	5.25	5.25	5.25	5.25	5.17½	4.87½	4.87½	4.87½	
1832...	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.87	4.84
1833...	4.56	4.56	4.56	4.56	4.60	4.63	4.63	4.68	4.88	4.90	5.03	6.47	4.84
1834...	7.70	7.44	7.31	6.58	5.88	5.50	5.50	6.19	6.41	6.50	7.13	8.05	6.64
1835...	8.25	*8.25	8.04	6.78	6.50	6.38	6.10	6.00	6.00	6.09	6.13	6.13	*6.72
1836...	6.13	5.91	5.28	5.25	5.16	5.13	5.13	5.13	5.10	5.00	5.00	5.00	5.27
1837...	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1838...	5.00	5.00	5.00	5.00	5.00	4.63	4.63	4.63	4.66	4.95	5.06	5.34	4.91
1839...	6.40	7.00	6.44	5.88	5.69	5.17	5.13	5.27	5.56	5.63	5.63	5.63	5.79
1840...	5.63	5.56	5.06	4.38	4.03	3.88	3.83	3.60	3.56	3.51	3.56	3.56	4.18
1841...	*3.50	*3.25	*3.25	3.25	3.25	3.25	3.25	*3.25	3.25	*3.25	3.25	3.25	*3.27
1842...	3.50	3.33	3.10	3.02	3.00	3.03	3.13	3.21	3.26	3.26	3.27	3.26	3.20
1843...	3.26	3.26	3.27	3.31	3.31	3.31	3.44	3.44	3.49	3.74	3.78	3.81	3.46
1844...	3.81	3.75	3.72	3.84	3.87	3.97	4.00	*3.94	3.96	3.88	4.00	*4.00	*3.90
1845...	3.88	3.81	3.81	3.81	3.60	3.63	3.69	3.83	3.95	3.88	3.88	3.88	3.80
1846...	3.90	3.90	3.58	3.44	3.37	3.29	3.33	3.56	3.46	3.41	3.39	3.36	3.50
1847...	3.36	3.36	3.45	3.62	3.62	3.86	3.88	3.81	3.75	3.69	3.67	3.50	3.62
1848...	3.50	3.50	3.40	3.31	3.25	3.25	3.25	3.25	3.25	4.25	4.25	4.25	3.64
1849...	4.28	4.13	3.56	3.31	3.10	3.00	3.00	3.05	3.17	3.20	3.25	3.00	3.34
1850...	3.18	3.47	3.40	3.44	3.44	3.45	3.45	3.40	3.56	3.56	3.56	3.50	3.46
1851...	3.42	3.44	3.45	3.47	3.47	3.47	3.47	3.64	4.03	4.19	4.19	4.10	3.70
1852...	4.50	4.50	4.25	4.39	4.81	5.16	5.55	6.00	6.00	5.81	5.68	5.60	5.19
1853...	5.60	5.28	4.53	4.50	4.50	4.45	4.28	4.19	4.19	4.19	4.15	4.06	4.49
1854...	4.06	4.25	4.25	4.25	4.05	4.00	4.00	4.00	4.12	4.13	4.10	4.08	4.11
1855...	3.92	3.92	3.92	3.89	3.85	3.85	3.88	3.87	3.85	3.82	3.82	3.82	3.87
1856...	3.83	3.83	3.77	3.47	3.22	3.23	3.35	3.25	3.32	3.32	3.32	3.30	3.43
1857...	3.28	3.38	3.34	3.20	3.20	3.20	3.20	3.20	3.19	3.20	3.34	3.29	3.25
1858...	3.28	3.29	3.30	3.50	3.23	3.31	3.36	3.39	3.50	3.53	3.62	3.63	3.40
1859...	3.63	3.63	3.50	3.24	3.23	3.29	3.37	3.40	3.35	3.33	3.33	3.33	3.39
1860...	3.33	3.33	3.11	12.78	12.78	3.64	4.58	4.85	4.98	5.22	5.50	5.63	4.14
1861...	5.38	5.25	4.63	4.75	5.50	5.80	6.25	6.50	6.75	7.25	7.50	7.13	6.06
1862...	7.10	6.75	6.59	7.20	7.88	8.34	9.78	10.75	10.13	8.90	8.88	8.38	7.839
1863...	8.38	8.38	8.03	8.10	6.75	6.25	6.03	6.50	8.32	9.93	8.81	8.25	7.86
1864...	7.94	7.75	5.40	5.25	5.13	5.53	5.88	5.68	5.47	5.34	5.25	5.05	5.80
1865...	5.06	5.06	4.47	4.50	4.44	4.38	4.28	4.07	4.09	4.01	4.00	4.00	4.37
1866...	4.00	3.13	3.13	3.22	3.25	3.25	3.25	3.25	4.10	4.50	5.22	6.00	3.86
1867...	5.15	6.01	4.15	3.81	3.90	5.00	6.59	7.17	6.15	6.00	5.87	5.12	5.31
1868...	5.07	4.79	4.79	4.50	4.50	4.44	4.31	4.44	4.33	4.19	3.69	3.55	4.39
1869...	4.05	**	**	**	**	4.52	4.45	4.25	4.35	4.68	4.72	4.63	4.46
1870...	4.63	3.78	3.50	3.50	3.50	3.50	3.50	3.59	3.71	3.90	3.90	3.90	3.74
1871...	3.90	3.90	4.00	4.00	4.10	4.20	4.40	4.40	4.60	4.60			4.16

PRICES OF LEHIGH COAL in Philadelphia, from Grotjan's Public Sale Report:—1822, May to December, \$8.40; 1823, January to August, \$10; September, \$9.50; October to December, \$8.40; 1824, January to April, \$8.40.

\* Uncertain.

† Rise due to freshet.

‡ Lowest average for month, \$2.78—April and May, 1862.

§ Highest average for month, \$10.75—August, 1864.

|| Lowest average for year, \$3.20—1844.

¶ Highest average for year, \$8.39—1864.

\*\* Owing to the long strike there was no Coal in first hands for sale during these months.

# PRICES OF CUMBERLAND COAL FOR TWENTY YEARS.

*Average Price, per ton of 2,240 lbs., of Cumberland Coal, delivered on board vessel at Baltimore, Md., from 1853 to 1873, together with the average freight to Boston.*

Prepared for the American Iron and Steel Association by ISRAEL W. MORRIS, of Philadelphia, and MESSRS. BORDEN & LOVELL, of New York.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average for year.	Average freight to Boston.	Average coal delivered in Boston.
1853...	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	2.80	6.06
1854...	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	2.25	6.12
1855...	4.25	4.25	4.25	4.00	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.89	2.37	6.12
1856...	4.35	4.35	4.35	4.00	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	1.84	6.12
1857...	4.35	4.35	4.35	4.50	4.28	4.24	4.23	4.15	4.23	4.25	4.25	4.25	4.28	1.73	5.43
1858...	4.12	3.75	3.80	3.75	3.50	3.73	3.62	3.75	3.62	3.75	3.75	3.75	3.70	1.83	5.45
1859...	4.12	3.75	3.37	3.18	4.07	3.65	3.45	3.93	3.42	3.55	3.55	3.55	3.63	2.55	6.04
1860...	3.00	3.66	3.42	3.50	3.37	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.44	2.25	5.69
1861...	3.00	3.66	3.42	3.50	3.37	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.44	2.25	5.69
1862...	3.00	3.66	3.42	3.50	3.37	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.44	2.25	5.69
1863...	5.50	6.00	6.00	5.66	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.57	3.28	8.85
1864...	5.75	5.75	5.83	6.00	6.14	6.21	6.21	7.41	7.00	8.36	8.36	8.63	6.84	3.39	10.23
1865...	8.56	8.56	10.25	9.01	8.00	6.50	6.75	7.00	7.00	6.75	6.75	6.75	7.57	3.79	11.36
1866...	6.35	7.00	6.00	6.00	6.00	6.00	5.75	5.66	5.62	5.66	5.62	5.66	5.94	3.53	9.47
1867...	5.00	5.00	5.25	5.13	5.08	4.88	4.92	4.88	4.92	4.88	4.88	4.88	4.97	2.68	7.65
1868...	5.00	5.00	4.87	4.75	4.70	4.70	4.68	4.67	4.70	4.75	4.83	4.83	4.71	3.21	7.92
1869...	5.00	5.00	5.00	4.96	4.96	4.96	4.96	4.96	4.96	5.00	5.00	4.96	4.97	2.83	7.80
1870...	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	2.64	7.36
1871...	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	4.72	2.73	7.45
1872...	4.70	4.65	4.62	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.75	4.75	4.66	3.06	7.72
1873...	4.75	4.75	4.83	4.93	4.93	4.85	4.85	4.85	4.88	4.88	4.75	4.75	4.85	3.05	7.90

THE COAL PRODUCT OF THE UNITED STATES IN THE CENSUS YEAR 1869-70—TONS OF 2,000 POUNDS.  
Compiled from the Census of 1870, by the *Pittsfield Miners' Journal*, and revised by the Census Office.

STATES.	No. of Counties.	No. of Collieries.	No. of Engines.	Power of Engines.	No. of Men.	No. of Boys.	Capital Invested.	Wages Paid.	Value of Materials Furnished.	Tons Produced.	Value of Product.	Average Value at Colliery.
Pennsylvania.	8	229	829	48,809	43,943	9,078	\$50,936,785	\$22,982,813	\$3,506,440	15,650,275	\$38,436,745	\$2.53
Anthracite.	26	359	69	1,851	10,517	334	16,974,918	8,995,495	604,691	7,798,518	13,921,069	1.77
Bituminous.												
Total for Pennsylvania.	34	588	898	50,660	60,460	9,412	\$67,911,703	\$31,978,308	\$4,201,131	23,448,793	\$52,357,814	
Illinois.	37	323	92	2,645	6,166	135	4,286,575	3,192,977	399,334	2,624,163	6,097,452	2.33
Ohio.	28	307	76	3,363	7,246	321	5,891,813	3,381,108	292,447	2,537,285	5,482,952	2.16
Maryland.	8	22	7	431	2,672	55	23,891,600	1,473,395	166,479	1,819,894	2,409,208	1.33
Missouri.	18	56	33	2,308	1,878		2,587,250	1,277,804	316,082	621,930	2,011,820	1.34
W. Virginia.	12	41	10	177	1,043	97	1,434,820	619,376	48,564	608,878	1,035,862	1.70
Indiana.	13	46	22	771	1,999	70	554,442	694,592	61,890	437,870	988,691	2.96
Iowa.	18	96	5	145	1,341	13	618,332	580,157	73,102	293,487	874,324	3.32
Kentucky.	15	30	4	125	676	38	717,350	278,411	27,898	150,582	446,795	2.97
Tennessee.	6	11	2	51	399	20	313,784	188,120	15,945	133,418	330,498	2.47
Virginia.	4	6	15	1,297	642		779,320	106,430	20,312	61,803	226,114	3.65
Kansas.	5	20	3	82	85	8	176,500	88,400	7,500	32,938	114,278	3.47
Michigan.	2	3	2	140	70	5	80,000	33,000	4,100	28,150	104,200	3.70
Rhode Island.	1	1	2	2	57		26,000	23,970	301	*14,000	59,000	4.21
Alabama.	2	2					850	2,950	14,500	11,000	39,000	3.54
Nebraska.	1	3			6	2	250,000	225,000	48,000	1,425	8,550	6.00
Wyoming.	1	1	1	20	150	15	300,000	250,000	48,000	50,000	800,000	16.00
Washington.	1	1	1	2	80		290,000	70,869	13,394	17,844	107,064	6.00
Utah.	2	6	1	15	25		44,800	2,550	5,985	5,800	14,950	2.58
Colorado.	2	3			16		36,000	9,000	2,410	4,500	16,500	3.66
Total.	238	1,566	1,173	62,310	84,563	10,191	\$110,008,029	\$44,316,491	\$5,668,955	32,863,690	\$73,524,992	

## RECAPITULATION.

Capital invested in collieries in the United States.	\$110,008,029	Value of the same at mines.	\$73,524,992
Wages paid in 1869.	44,316,491	Number of men employed.	84,563
Supplies furnished at mines in 1869.	5,668,955	boys.	10,191
Production of coal in 1869—Anthracite.	15,654,275	Number of steam engines used in mining.	94,757
" " Bituminous.	17,190,415	Horse-power of ditto.	1,173
Total production in 1869.	\$32,863,690	Number of collieries worked.	62,310
		Number of counties in which collieries were worked.	1,566
		* Anthracite.	238

## THE ANTHRACITE COAL TRADE OF PENNSYLVANIA.

FROM ITS COMMENCEMENT. (SHIPMENTS ONLY.)

TONS OF 2,240 POUNDS.

By P. W. SHEAFER, Engineer and Geologist, Pottsville, Pa.

Year.	Lehigh. Tons.	Schuylkill. Tons.	Wyoming. Tons.	Total Tons.	THE CUMBERLAND COAL TRADE, From its Commencement. (Shipments only.) — Tons of 2,240 pounds. — Compiled from official sources, by C. SLACK, Esq., Mount Savage, Md.
1820.....	365			365	1842..... 1,708
1821.....	1,073			1,073	1843..... 10,082
1822.....	2,240			2,720	1844..... 14,590
1823.....	5,823	1,480		6,981	1845..... 24,653
1824.....	9,541	1,128		11,108	1846..... 29,795
1825.....	28,393	1,567		34,893	1847..... 52,940
1826.....	31,280	6,500		48,047	1848..... 79,571
1827.....	32,074	16,767		63,434	1849..... 142,449
1828.....	30,232	31,360		77,516	1850..... 196,848
1829.....	25,110	47,294	7,000	112,083	1851..... 257,679
1830.....	41,750	79,973	43,000	174,734	1852..... 334,178
1831.....	40,968	89,984	54,000	176,820	1853..... 533,979
1832.....	70,000	81,864	84,000	335,271	1854..... 659,681
1833.....	123,001	209,271	111,777	487,749	1855..... 682,272
1834.....	106,244	252,971	43,700	376,636	1856..... 706,450
1835.....	131,250	226,692	90,000	560,758	1857..... 582,486
1836.....	148,211	339,508	103,861	684,117	1858..... 640,656
1837.....	223,902	432,045	116,387	869,441	1859..... 724,354
1838.....	213,615	530,162	78,207	869,441	1860..... 788,909
1839.....	221,023	446,875	122,300	818,402	1861..... 269,674
1840.....	225,313	475,077	148,470	864,379	1862..... 317,634
1841.....	143,037	490,596	192,270	959,773	1863..... 748,345
1842.....	272,540	624,466	252,599	1,108,412	1864..... 657,996
1843.....	267,793	583,273	285,605	1,263,598	1865..... 903,495
1844.....	377,002	710,200	365,911	1,680,850	1866..... 1,179,331
1845.....	429,453	1,131,724	451,836	2,013,013	1867..... 1,193,822
1846.....	517,116	1,308,500	518,389	2,344,005	1868..... 1,330,443
1847.....	633,507	1,665,725	583,067	2,882,309	1869..... 1,882,669
1848.....	670,321	1,733,721	685,196	3,089,238	1870..... 1,717,075
1849.....	781,656	1,728,500	732,910	3,242,966	1871..... 2,345,153
1850.....	690,456	1,840,620	827,823	3,358,899	1872..... 2,355,471
1851.....	964,224	2,328,525	1,156,167	4,448,916	
1852.....	1,072,136	2,638,835	1,284,500	4,993,471	
1853.....	1,054,309	2,666,110	1,475,732	5,195,151	
1854.....	1,207,186	3,191,670	1,608,478	6,002,334	
1855.....	1,284,113	3,552,943	1,771,511	6,608,567	
1856.....	1,351,970	3,602,999	1,972,581	6,927,580	
1857.....	1,318,541	3,373,797	1,952,603	6,644,941	
1858.....	1,380,030	3,273,245	2,186,094	6,839,369	
1859.....	1,628,311	3,448,708	2,731,236	7,808,255	
1860.....	1,821,674	3,749,632	2,941,817	8,513,123	
1861.....	1,738,377	3,160,747	3,055,140	7,954,264	
1862.....	1,351,054	3,372,583	3,145,770	7,869,407	
1863.....	1,894,713	3,911,683	3,759,610	9,566,006	
1864.....	2,054,669	4,161,970	3,960,836	10,177,475	
1865.....	2,040,913	4,356,959	3,254,519	9,652,391	
1866.....	2,179,364	5,787,902	4,736,616	12,703,882	
1867.....	2,502,054	5,161,671	5,325,000	12,988,725	
1868.....	2,507,582	5,335,731	5,990,813	13,834,132	
1869.....	1,929,523	5,725,138	6,068,369	13,723,030	
1870.....	3,172,916	4,851,855	7,825,128	15,849,899	
1871.....	2,116,683	6,314,422	6,682,302	15,113,407	
1872.....	3,743,278	6,469,942	8,112,905	19,026,125	
					21,253,688

## THE BRITISH IRON EXPORT TRADE.

FOR 1871, 1872, AND FIRST NINE MONTHS OF 1873.

From British Board of Trade Returns. Tons of 2,240 pounds.

PRINCIPAL ARTICLES.  TO ALL COUNTRIES.	Twelve months ended 31st December.			
	QUANTITIES.		VALUE.	
	1871.	1872.	1871.	1872.
	Tons.	Tons.	£	£
Pig-iron.....	1,057,458	1,332,726	3,229,408	6,721,966
Bar, angle, bolt and rod.....	349,084	313,876	2,921,777	3,635,558
Railroad of all sorts.....	981,197	947,548	8,084,519	10,237,768
Wire of iron and steel (except telegraph) galvanized or not.....	26,200	33,605	446,159	674,743
Hoops, sheets, boiler and armor plates.....	200,337	208,423	2,399,203	3,430,970
Cast or wrought, and all other manufactures (except ordnance,) unenumerated.....	243,298	269,614	3,588,364	4,778,785
Iron, old, for re-manufacture.....	139,812	108,181	672,696	661,931
Steel, unwrought.....	39,189	45,285	1,198,428	1,491,240
Manufactures of steel, or steel and iron combined.....	13,038	11,130	682,855	614,842
Total of iron and steel.....	3,169,219	3,388,622	26,124,134	36,060,547
Steam engines.....			2,064,004	2,603,390
Other machinery and mill-work.....			3,902,037	5,595,702

PRINCIPAL ARTICLES.  TO ALL COUNTRIES.	Nine months ended 30th September.			
	QUANTITIES.		VALUE.	
	1872.	1873.	1872.	1873.
	Tons.	Tons.	£	£
Pig-iron.....	1,038,436	896,635	5,018,894	5,595,034
Bar, angle, bolt and rod.....	245,513	221,644	2,742,703	2,871,131
Railroad of all sorts.....	720,970	591,596	7,511,121	7,783,382
Wire of iron and steel (except telegraph wire) galvanized or not.....	25,606	22,484	489,100	526,610
Hoops, sheets, and boiler and armor plates.....	153,311	156,448	2,404,874	2,846,078
Cast or wrought, and all other manufactures (except ordnance,) unenumerated.....	196,804	220,747	3,382,817	4,288,270
Iron, old, for re-manufacture.....	85,805	61,673	520,392	341,122
Steel, unwrought.....	33,068	30,330	1,066,485	1,121,284
Manufactures of steel, or steel and iron combined.....	8,412	8,008	453,081	542,814
Total of iron and steel.....	2,602,883	2,296,990	26,590,681	29,144,217
Steam engines.....			1,809,657	2,225,106
Other machinery and mill-work.....			3,787,893	5,173,965

PRINCIPAL ARTICLES.  TO UNITED STATES.	QUANTITIES.			VALUES.		
	1871.	1872.	1873.*	1871.	1872.	1873.*
	Tons.	Tons.	Tons.	£	£	£
Pig-iron.....	190,183	193,957	87,958	594,086	1,012,441	595,478
Bar, angle, bolt and rod.....	64,301	64,995	21,958	534,205	747,101	292,332
Railroad of all sorts.....	512,277	472,760	151,972	3,976,857	4,863,677	1,967,872
Hoops, sheets, boiler and armor plates.....	41,520	31,448	15,913	409,686	437,363	275,855
Cast or wrought, unenumerated.....	10,671	13,444	13,828	180,005	308,004	286,742
Steel, unwrought.....	21,133	24,051	15,173	620,537	779,878	552,767
Total.....	840,085	800,655	307,802	6,315,376	8,148,464	3,971,046

\* Nine months ended 30th of September.



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